COAL AGE

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"
Published by McGraw-Hill Publishing Company, Inc.
WILLARD CHEVALIER, Vice-President

APRIL 1937

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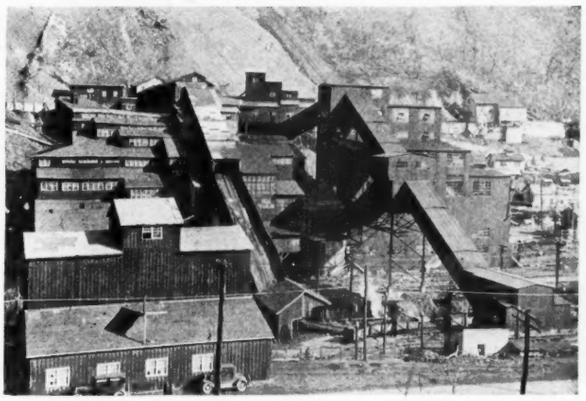

The Old and New At Cameron Colliery
See p. 145

CONTENTS

Volume 42 No. 4

Slusher Rock-Handling Nets 4.03 Cu. Yd. per Man-Day.... 143

Anthracite Cleaned Before Breaking to Domestic Sizes.... 145
By GEORGE H. JONES

New Preparation Plant Tops Off Improvement Program.... 148

Millfield Modernization Triples Mean Hourly Output..... 152
By FRANK G. SMITH

Fireless Cooking Makes Smokeless Fuel and Byproducts.... 155
By JAMES E. LOUTITT

WPA Mine-Sealing Program Reduces Stream Pollution..... 158
By PERRY A. FELLOWS

Congress Speeds Coal-Control Legislation on Its Way..... 171

Appalachian Conferees Wrestle With Wage Problems.... 176

- **Washington** may be the cynosure of coal eyes most of the time, but Cincinnati again steals the spotlight when the American Mining Congress stages its 14th annual convention and equipment exposition at the Queen City. Record-breaking attendance is forecast. The advance story will appear in our May Pre-Convention Issue; the report of the convention itself will be highlighted in the June Post-Convention Number.

- **Successful operation** of conveyors at Powellton, working in a 30- to 42-in. bench, requires rapid handling of 36 to 48 in. of bottom rock. Koppers management there found the answer in a special type slusher which nets 4.03 cubic yards of very hard sandy shale per man-day. How this slusher rock-handling operates is told in the story beginning on page 143.

- **Strip mining** will be featured in a number of articles scheduled for publication in early issues of Coal Age. The line-up includes a story on one of the most recent large-scale developments in Illinois, a new stripping operation in Iowa and an omnibus review of certain significant equipment trends and practices as exemplified at a number of Mid-Western pits.

- **Turning a blend** of coking and non-coking coals into smokeless fuels and valuable gas and oil byproducts is claimed for the Coalene process of low-temperature distillation developed on the Pacific Coast. Steam, heated to a final temperature of 1,200 deg. F., is the carbonization agent. James E. Loutitt, one of the co-inventors, describes the process and its results in the story starting on page 155.

- **Two phases** of mechanization will be discussed in forthcoming articles on Ohio developments. One will cover the use of mobile loaders; the other, the combination of mobile machines and conveyors: one will feature the operations of a long-established company; the other, the story of a comparative newcomer in the field who also believes mechanization is the key to successful coal mining.

- **Modernization** of the Rachel mine, restored to the active list last June after a two-year shutdown, includes both an underground improvement program and new topworks. Major objectives in the program of rehabilitation for this northern West Virginia operation and the progress made—particularly in transportation, drainage and preparation—are outlined in the article which begins on page 148.

Editorials 141
Notes From Across the Sea.....162
On the Engineer's Bookshelf.... 163
Operating Ideas 164
Word From the Field..... 169
New Equipment 179

COAL AGE is published monthly on the 1st. $3 per year in the United States, Canada, Mexico, Central and South America; other countries, $5, or 20 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable address: "McGrawhill, N. Y." Member A.B.P. Member A.B.C.

Contents Copyright 1 9 3 7 by

McGRAW-HILL PUBLISHING COMPANY, INC.
Publication Office, 99-129 North Broadway, Albany, N. Y.
Editorial and Executive Offices, 330 West 42d St., New York, N. Y.

JAMES H. McGRAW, JR., Chairman — MALCOLM MUIR, President — JAMES H. McGRAW, Honorary Chairman
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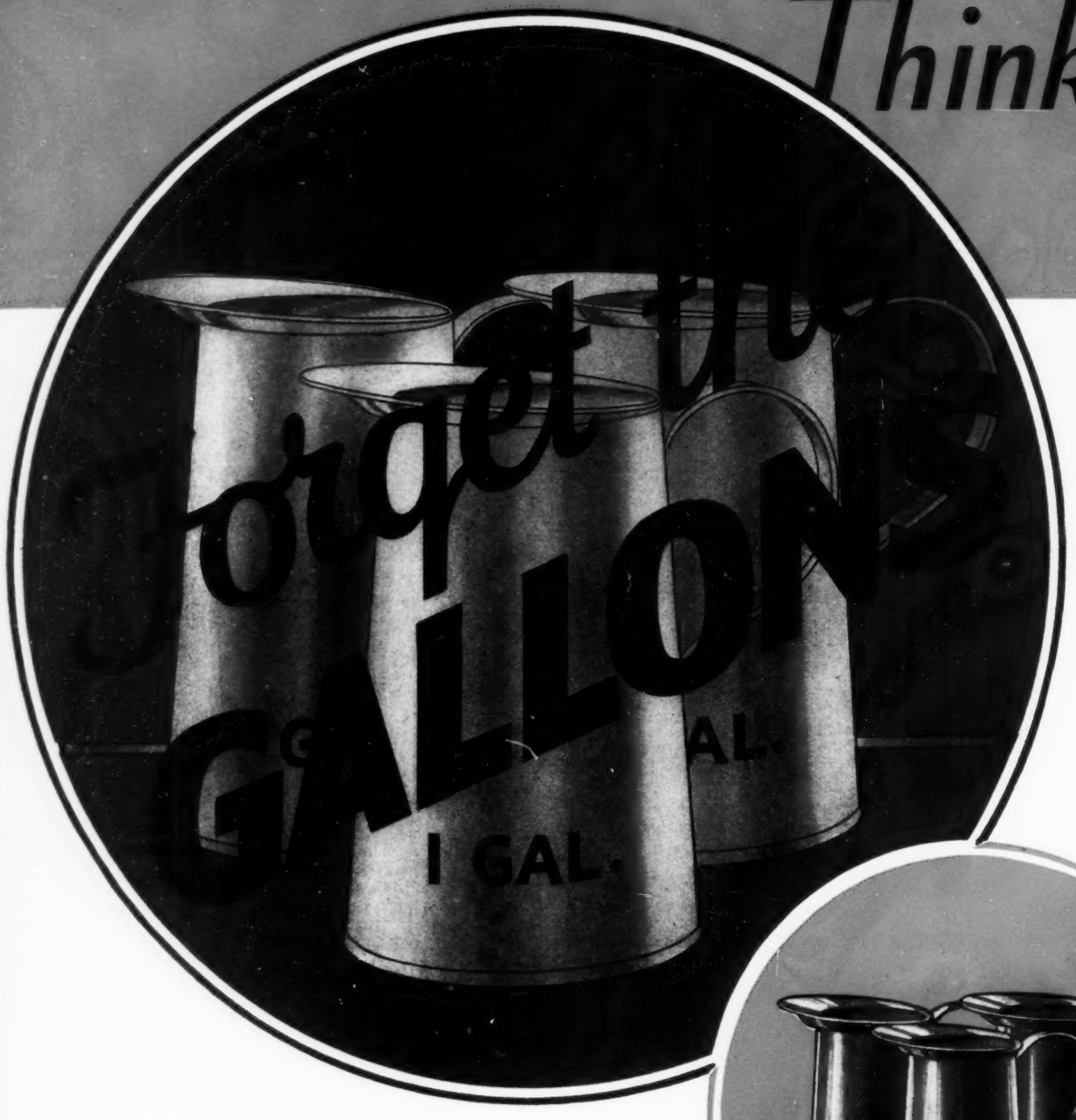

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COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

April, 1937

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"Pure Air"

BEFORE LOUISVILLE was hit by the flood the livest topic of conversation was smoke abatement, with the coal industry the target of editorial shafts. St. Louis, too, has been exercised over the same subject and has passed a coal-quality ordinance which makes the cynical chortle. These cases are symptomatic of a public interest by no means confined to the two cities mentioned. The "pure air" movement is growing and must be taken into serious account by the industry in its future planning.

Health a Defense

MINERS are less prone to silicosis if they have not had other pulmonary diseases to weaken their resistance and will not suffer disability from silicosis if their lungs are not infected. Thus general pulmonary health is a defense both against the disease and its disability. Important, therefore, is it to keep the worker, heated from his task, from catching cold on his way from the mine to his home.

A good draft-free bathhouse with a cooling shower and warm, dry clothes, no long walks in mine clothes from mine mouth to lamp house, check-room or pay station, a warm place to await the cage and a not too chilly ride to the shaft are ways of keeping that health without which the onset of silicosis is likely to be hastened. In some mines the worker does not come to the open air until he has left the change house.

Watch must be kept on the occurrence of tuberculosis in the mining community. Above all, the cooperation of the miner must be enlisted. He, like the rest of us, wishes to appear hardy and resents any suggestion that he should avoid exposure to sudden changes of temperature; he feels that it is his business how well he is clad as he rides the man-trip. Health, here as always, is nature's best defense.

Progress

HOW FAR Congress will go in eliminating the more glaring defects of the Guffey-Vinson coal-control measure will not be known, of course, until the bills have been acted upon by both houses. Changes made in the Vinson version before passage by the lower house last month, however, give some hope that more workable proposals will find Congressional approval before the measure becomes a law. Outstanding has been the splitting of the original fantastically conceived Minimum Price Area No. 1 into two separate areas.

Although the idea of price correlation between competing districts is still inherent in this change, the splitting process represents real progress toward a more sane and practical solution of the problems of price control. Now that this concession to common sense has been made, a super-optimist might even expect that Congress would go still farther and limit price fixing to the setting of minimums—and, when necessary, maximums—for individual producing fields. But there seems little probability that this will be done.

As in predecessor bills, the present proposals continue the attempt to establish a control system which shall be both permissive and mandatory. Regulation of prices and of unfair competitive methods, states the preamble to H. R. 4985, "is necessary to promote interstate commerce in bituminous coal and to remove burdens and obstructions therefrom." But any producer who is willing to pay a punitive tax is free to ignore the regulatory rules laid down. Thus license to flout the law and its

administration is not only purchasable but is specifically sanctioned by the terms of the proposed regulation.

Clean Out Sumps

BEFORE THE DAYS when peak loads troubled the operator, water was pumped as fast as his equipment could handle it. Later he found it profitable to provide large sumps so that he could allow the water to gather until he could pump it without reaching a peak load. Again, he provided even larger sumps to enable him to handle heavy influxes over a long time and so save the installation of much equipment.

Such large sumps usually are old workings where miners have stored pyrite, roof coal and bone—prolific sources of acid. Bottoms and pillars are creviced so that water and air can enter them. At times, a large part of the area is almost dry, and air enters to convert pyrite to ferrous sulphate. At others, the water covers broad expanses of the area and these iron salts are dissolved. Such an ebb and flow is sure to create acidity in the mine water, and savings in electricity will be offset by increased maintenance or heavy costs for acid-resisting equipment. Such sumps should be cleaned of pyrite, fallen roof coal, shale and clays so that they will not generate acid with every rise and fall of the impounded waters.

Dangerous Protection

COAL MEN complain with justice that it is unfair to surround the conduct of their business with restrictions while rival sources of energy are left unhampered in the invasion of choice competitive markets. So the suggestion is frequently made that some equalization of competitive opportunities should be effected through taxes upon the sale and consumption of natural gas and fuel oil. Certain Illinois interests, for example, again are advocating a State tax on natural gas; in some quarters, a federal impost on fuel oil is urged as vital to the salvation of the anthracite industry.

While the principle of equalization long has been accepted in protecting home industry against foreign competition, domestic tariff walls have been frowned upon since the days of the framing of the Constitution. Moreover, a tax is a dangerous protection. If local or national taxes are laid upon oil or gas this year, the invitation to place comparable imposts on coal most likely would prove irresistible to revenue-seeking legislatures in succeeding years. The risk of seeing coal hoist with its own petard is too great for pleasant contemplation.

Malevolent or Helpful?

AT THE TURN of the century many fans were introduced, and major mine disasters frequently occurred. Were these disasters due to increased quantities of dust or to increased, but ill-distributed, ventilation? Possibly both. Earlier mines had such foul air that a small ignition raised the percentage of carbon dioxide from near that of the extinction point with firedamp to the actual point of extinction. An ignition was followed by only a feeble explosion and soon extinguished itself. Witness the practice of lighting methane in European mines two or three times a day to make the working faces safe.

After mines were "ventilated," the air in the roadways became almost as fresh as that on the surface, but air at the faces was little better than before. When firedamp and dust at the face exploded, burning gas and ignited coal dust found their way to the headings and, reaching fresh air, the explosion became exceedingly violent. Early in the present century, Professor Harger advocated adding carbon dioxide to the air to reestablish its former extinctive quality, but obviously the better plan was to use pure air in sufficient quantity and to devise ways of causing the air to clear the face of methane as fast as it was emitted. Even today, lack of adequate distribution sometimes makes the ventilating current malevolent rather than helpful.

An air current is of value only when it clears the gas from all places where it may be ignited. Care must be taken that the ventilating currents do not raise dust and thus aid explosions, and that the dust created in mining be reduced in quantity or so removed as not to menace safety. Means of measuring the slower air currents at the working face also are much needed.

SLUSHER ROCK HANDLING

+ For Conveyor Mine Development

Nets 4.03 Cu.Yd. Per Man-Day

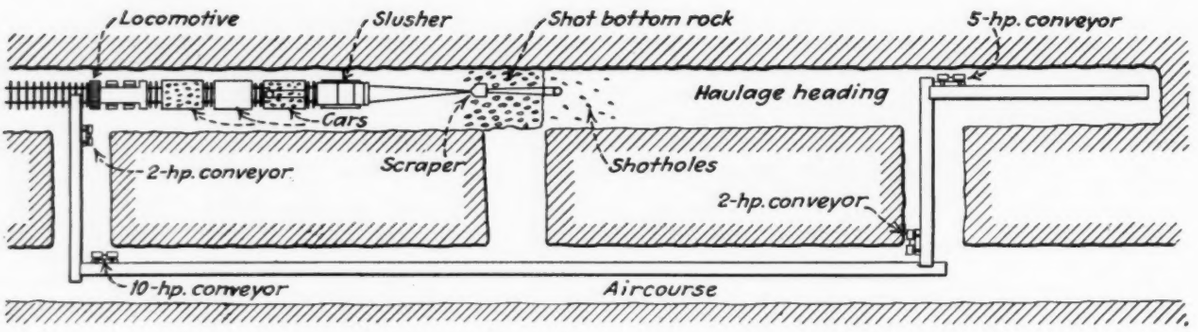
LIFTING bottom rock on the car-haulage heading in connection with conveyor work in the No. 5 mine of the Koppers Coal Co., at Powellton, W. Va., is accomplished at a labor efficiency rate of 4.03 cu.yd. per man-day — including drilling, shooting, loading, transporting one-half mile to the outside and dumping. Loading is done with Kanawha slushers designed by division officials of the coal company. In the experience of more than three years and totaling 4½ miles of haulage heading the slusher method has proved highly satisfactory and maintenance cost has been negligible.

The No. 5 mine is in the Powellton seam, which in that locality consists of two benches separated by a dense, hard fireclay parting ranging from a few inches to several feet in thickness. In some sections both benches are mined; in others only the top bench is taken and in places only the bottom bench is mined. The conveyor mining is in the bottom bench, which is 30 to 42 in. thick and consists of a byproduct gas coal. The seam has a general dip of 2 per cent to the northwest, but the local grades reach 6 per cent in some places.

One thousand tons per day, or approximately 30 per cent of the No. 5 production, is conveyor mined. The coal is hand loaded onto chain-flight conveyors delivering to room conveyors of the same type, which in turn load into the cars at the room neck. Headings, which also are worked by chain-flight conveyors, are driven 14 to 16 ft. wide in the coal, and on the haulway bottom rock is taken 11 ft. wide and to a depth which will provide 5 ft. of clearance between top of rail and headers. This requires 80 in. total, and to attain this height it is necessary to take out 36 to 48 in. of the bottom rock, or an average of approximately 42 in. The material thus to be removed is a very hard sandy shale.

In the slushers used at Powellton, the hoist drums are mounted on a shaft so that they can be swung down out of the way for traveling, and the boom is a quick-detachable type for convenience in moving around curves. Both of these are patented features devised by C. R. Stahl, division superintendent, and W. B. Parks, formerly mine superintendent. Provision for swinging the drums down to reduce machine height is important when using the slusher for development in low coal. In practice it was found that any complete hoist which could be mounted on the cradle had insufficient capacity for the speed desirable; therefore, the motor is mounted underneath the slide and the drive connection is completed through a chain, cradle shaft and a gear. By having the boom readily detachable it is

Over 4 cu.yd. per man-day shot, loaded, hauled and dumped—that is the reason for using the slusher. Other advantages are the low maintenance cost and small degree of skill required of an operator



Single-unit conveyor layout, showing slusher in use on third shift when conveyors are idle

conveniently dropped onto a mine car for moving.

When the conveyor work was started in 1933, the bottom rock was hand loaded; it was found, however, that with this method the rock advance could not be kept in pace with the conveyor development in the coal. Primarily for that reason, but also with the expectation of reducing cost, two Kanawha slushers were put into use in 1934. Later two more were added, and now, of the four machines, three are in regular use in the No. 5 conveyor development and one is in reserve as a spare.

Normal net advance of a two-heading entry driven by double-shift conveyor work using a single unit—i.e., one conveyor alternated for the haulage heading and aircourse—is 18 ft. per day, or 360 ft. per month. In order that there be no interference with the haulage of coal it is desirable that the rock be loaded on the third or off shift and that is the practice followed in No. 5.

Two drillers working on the day shift, two shooters on the second shift and three men working on the third or off shift constitute a normal rock-work crew. Of the three men on the loading shift, one operates the slusher, one trims the cars and helps the third man handle the cars to and from the slusher boom and the sidetrack. While two men are shifting cars the slusher operator inspects and lubricates his machine, breaks large pieces of rock, changes position of the head-sheave and drags rock closer to the slusher.

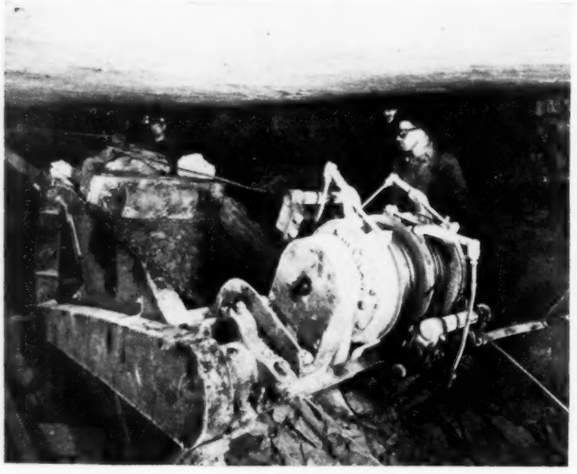
Although the slusher will handle lumps as large as or larger than will a rock gate of usual dimensions, speed of handling is gained by shooting so as to hold the size of lumps within reasonable limits. On a staggered-row pattern of 3-ft. centers each way, shotholes are drilled at an angle and each is loaded with one stick of $1\frac{1}{8}$x8-in. permissible.

Jackhammers and jackbits are used and the compressed air is supplied by a 300-cu.ft. 12x10-in. stationary compressor capable of operating five jackhammers and driven by a 50-hp. motor and situated not over 1,000 ft. from the work. Four-inch pipe is used for the main air line and 2-in. for the branches. In emergencies when unexpected quantities of water are encountered, the branch air lines are used temporarily as dewatering discharge lines. This practice, of course, has the disadvantage of getting some dirt into the pipes; therefore, is not used where a definite quantity of water is encountered and a separate line is justified.

Electrical and mechanical maintenance costs of the slushers have been so small that management felt that there was no point in keeping them on a unit basis. Replacements of wire rope and of the manganese-steel shoe of the scraper constitute the principal items. Relatively slight skill is required to operate the slushers efficiently and to attain these low maintenance costs.

At the 1935-37 labor rates, the cost to lift the bottom rock by hand-loading methods would approximate 20c. per inch per yard—equal to $8.40 per lineal yard, or not less than $2 per cu.yd. The actual accomplishment average of 4.03 cu.yd. per man-day of total labor represents a saving of more than half. Local officials of the company believe it will be some time before a cheaper and safer method will be devised for handling rock for the typical conveyor mining work in low coal.

Drums are mounted on a cradle shaft so they can be swung down out of the way for traveling in low places



The boom is easily detached for dropping onto a car so as to permit transporting the slusher around curves

CAMERON BREAKER

+ Cleans Coal Before Breaking

To Domestic Sizes

By G. H. JONES

Mine Manager, Stevens Coal Co.
Shamokin, Pa.

MOST of the coal in the Southern and Middle anthracite regions pitches at such heavy inclinations that it is impossible to clean it as it is being mined. Usually, therefore, it comes to the foot of the breaker with a high percentage of parting rock, making it necessary, if the rock is hard, to pick or jig it and clean it to such a degree that the rolls can handle it without damage.

When also in the sand separation process, cones are at different levels, sand and water from one cone can be dropped to another to reach a common destination below all the cleaning units, making it possible to provide only one sand cone and to lift the mixture by a single pump.

Coal is degraded in the filling and emptying of storage pockets; this degradation material must be removed completely or the coal will not pass inspection for undersize. If the coal is friable, short inactive lip screens will not do this satisfactorily.

These three considerations influenced the Stevens Coal Co. in the design of its new breaker at Cameron Colliery, Shamokin, Northumberland County, Pennsylvania, and, to meet them, three innovations were made to save labor and expense and to improve product. They are embodied in the entirely new structure completed and set in operation in January of the present year.

The mine product above 5 in. (round screen) is picked before it is reduced to broken-and-smaller and is treated in a Chance cone before being crushed to domestic sizes. The sand-laden washing medium is "cascaded" from the large cone to two smaller cones; and shaker screens, instead of the ordinary lip screens, receive the coal from the pockets for the larger sizes, completely removing undersize. These features and others differentiate the cleaning and sizing practices at Cameron Colliery from those in other parts of the region, though the cascading practice has been adopted at one other plant.

About half the coal mined at Cameron Colliery comes in two-car trips up No. 1 slope to a headframe and dump which is about 200 ft. to the northeast of the breaker and, being hauled onto an extremely heavy pitch near the head of the slope, is dumped by releasing the gates at the rear of each car. The coal falls into a chute which leads it to a scraper conveyor on a 10½-deg. inclination by which it is carried to the top of the breaker.

Other coal arrives in trips at the foot of the breaker from the water-level West drift and is spotted by a long pneumatic pusher which places the cars in turn in a Roberts & Schaefer revolving dump by which they are discharged into a hopper pit. There a scraper conveyor on a 31½-deg. inclination lifts the coal to the top floor of the structure.

West drift receives all the coal from the Four-Vein plane, from which in turn have been driven two levels to the west. Tunnels from these intercept the various beds. These levels and tunnels with their various chute openings constitute the Top and Middle lifts, to which should be added the Bottom lift, or Water-Level, already mentioned. All this coal comes from above water level.

No. 1 slope, which is 448 ft. long and on an average pitch of 39 deg., takes care of the coal from No. 1 slope level and also of that from No. 12 slope, which latter is driven down from that level and receives coal from slope level No. 12. These two levels and the tunnels driven from them remove all the coal below the creek bottom and constitute an almost entirely separate operation from that delivering coal to the Water-Level drift. Coal is obtained in all from eight separate beds, running from 4 to 14 ft. thick and pitching at an inclination averaging 55 deg. It is worked on the full-battery system.

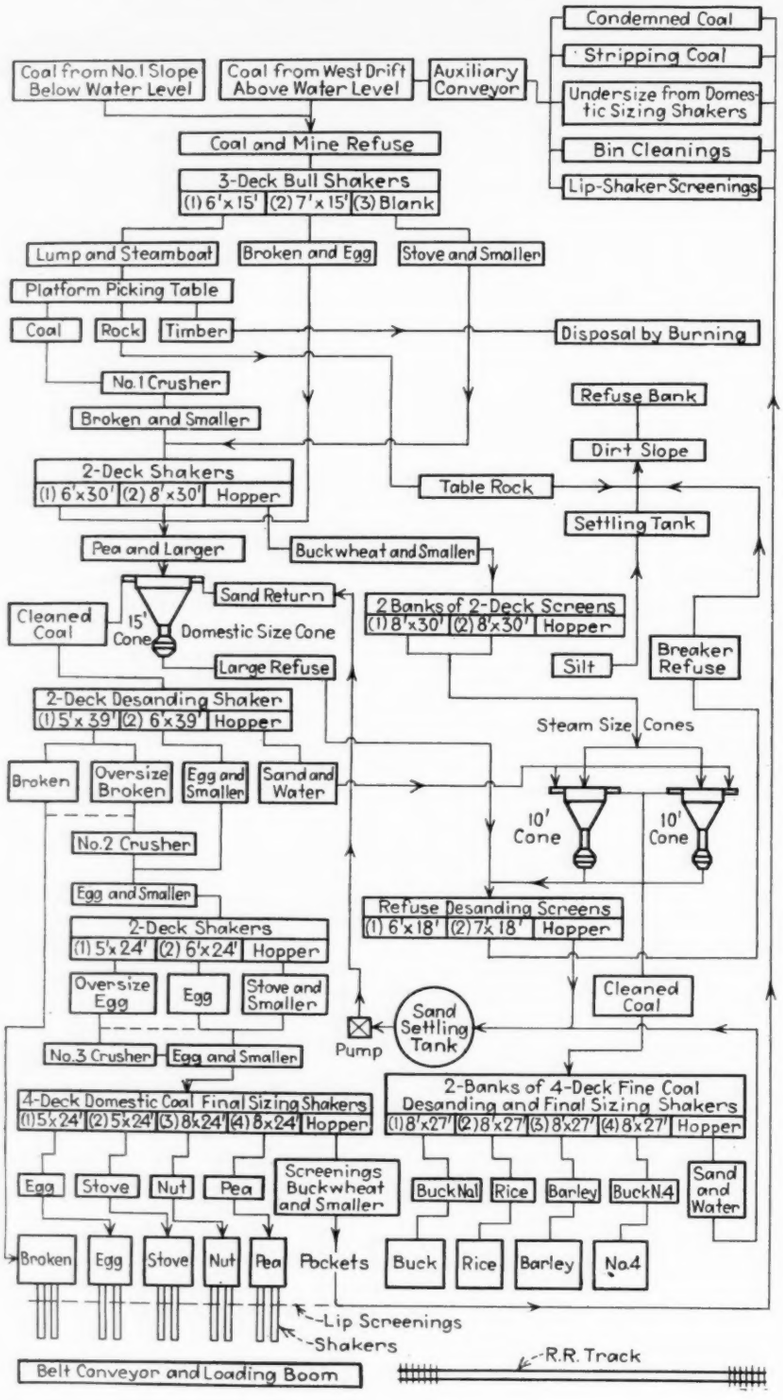
To supply as uniform a raw product as possible, thus eliminating cleaning difficulties, and to obtain a final product of uniform character, cars from each source are dumped as nearly alternately as possible. To the conveyor which takes coal from the hopper under the revolving dump, condemned coal and stripped coal from cars and trucks are delivered by an auxiliary conveyor. To this unit is brought any coal not derived from either the West drift or No. 1 slope.

All the product of the mine and strippings, on arrival at the head of the breaker, is delivered to a bull shaker which has two decks, one 6x15 ft. and one 7x15 ft., with a blank pan below these. The top deck is pierced by 5-in. round holes through which only broken and smaller sizes will pass. The second deck removes broken and egg sizes and passes stove and small sizes to the blank pan. Lump and steamboat held on the upper deck slide off at its end onto a 5x22-ft. shaking picking platform with slightly raised edges. Here the rock, timber and

plank are removed by four pickers, who drop the former material into a rock chute for disposal on a rock dump and the two latter into another chute for later disposition by burning.

Thus the large material is so freed from rock that it is safe to break it in No. 1 rolls, which reduce it to broken-and-under. After the breaking, the product combined with the broken and smaller sizes from the bull shaker arrives at shaking screens having one deck 6 ft. wide by 30 ft. long and another 8x33 ft. These separate buckwheat No. 1-and-smaller, leaving all sizes larger than pea up to broken and even some oversize broken to go to a 15-ft. Chance circular cone, which removes the heavy material through the trap at its base. The operation of this trap is controlled from the level of the top of the cone, so no attendance at the gates is needed. A push-button permits of such immediate opening or closing of the trap gates as may be desired. This pushbutton is located near the top of the cone, where an attendant is posted to observe and regulate its performance. The gates of this and the other cones are operated by compressed air electrically controlled.

Fig. 1—Flowsheet of sand-separation breaker, Cameron Colliery, of the Stevens Coal Co., Shamokin, Pa.



Light material passes off at the top of the cone with sand and water. This mixture travels to a two-deck shaker with one deck 5 ft. wide and 39 ft. long and a second deck of 6 ft. width and equally long. Each deck has thirteen jackets, and the first six of these on both decks are devoted to removal of sand and water; the next five on the top deck pass egg-and-smaller to the lower deck and the last two pass broken. Oversize broken, therefore, travels the full length of the top deck and passes off at the end; broken discharges at the end of the lower deck, and egg-and-smaller, after falling to the second deck, travels to a point above the entrance of broken and is diverted to a gravity chute.

Can Make Egg Size Coal

Oversize broken, on leaving the screen, enters No. 2 crusher rolls, where it is reduced to egg-and-smaller, with, of course, some oversize. Broken coal goes to the broken pocket or may be diverted to the No. 2 rolls to be converted also to egg-and-smaller. This coal mixes with that of the like size from the five jackets of the upper deck of the desanding shaker.

Everything now is egg-and-smaller, except for a little oversize egg, and is passed to a two-deck shaker of which the upper deck is 5 ft. wide and 24 ft. long; the second is of the same length but 6 ft. wide. The top deck has, at the upper end, screens that will pass stove-and-smaller and, at the lower end, openings that will pass egg. Only oversize egg will travel to the end of the screen, and this enters the No. 3 crusher rolls, where it is reduced to stove-and-smaller. Coal of stove-and-smaller size passing through the upper part of the top deck is conveyed by the second deck and a gravity chute to a point below the No. 3 rolls, where it joins the coal broken in that crusher. Egg coal passing to the lower deck may be passed either to the No. 3 rolls to be broken to stove-and-smaller or may join the stove coal below

the No. 3 rolls if there is a market for egg.

The product is now egg-and-smaller or stove-and-smaller and is ready for final sizing into a domestic-coal product. It passes to sizing shakers with four decks. On the two upper decks, 5 ft. wide and 24 ft. long, egg and stove are segregated and pass to their respective pockets. On the two lower decks, each 8 ft. wide and 24 ft. long, nut and pea are obtained. As all the undersize has been derived from crushing and sizing and none from the mining of the coal, little of it is present. For this reason the first three jackets of the lowest, or pea, deck are blank, the next two serve for dewatering and only the last two are used for removal of undersize, which is taken by a gravity chute to the conveyor by which lip-shaker screenings are lifted from the bottom to the top of the breaker.

Before the coarse coal was fed to the 15-ft. cleaning cone, it was divested of its buckwheat No. 1-and-smaller size, as already has been stated. This material is received in a steel hopper and carried by gravity chute to the rear end of two sets of screens, each 8 ft. wide and 30 ft. long. These are used for washing away the minus 3/64-in. silt from these fine sizes. This silt, being finer than No. 4 buckwheat, goes to a settling tank, the sludge from which is hauled up the dirt slope to the top of the mountain and dumped.

Steam Cones on Time Cycle

Material thus desilted on the screens goes directly to two 10x10-ft. square-topped cones for cleaning. The discharge of refuse material from these cones is on a time cycle which can be regulated over a wide range to accommodate varied conditions. However, should either condition, quantity or ash content of the feed change temporarily, so that regulation in contravention of the time cycle provided is found necessary at any time, the discharge of refuse can be regulated by push-buttons near the cone heads. When operating on a time cycle, the cones dump alternately.

Overflow from the cones is led to two banks of four-deck shaking screens 8 ft. wide and 27 ft. long. On these the sand-and-water are removed; and buckwheat No. 1, rice, barley and buckwheat No. 4 segregated to pass to their several pockets.

Refuse from the 15-ft. cone passes to the top, or 6x18-ft., deck of the refuse screens and that from the two 10x10-ft. cones to the lower, or 7x18-ft., deck, which remove the sand and water. The refuse thus drained and desanded is hauled up the dirt slope to the top of the mountain. Sand and water are carried from the sand shakers near the 15-ft. cone to the two 10x10-ft. cones. From these the mixture passes to the sand shakers of the 10x10-ft. cones and goes to the sand sump. Here it is lifted by a Goyne sand pump to the 15-ft. cone. In every instance sand-and-water mixtures travel in rubber pipe, which has been found to give high resistance to abrasion. The largest pipe is that from the sand-circulating pump to the 15-ft. cone; it has a diameter of 10 in.

Fig. 2—Old Cameron breaker on left, to be demolished, and new breaker on right. Note contrast in size.

In the 80-ton storage pockets, degradation forms undersize; hence under each pocket containing broken, egg, stove, nut or pea, a chute has been equipped with two shakers 3 ft. wide and of 9 ft. effective screening length; the eccentric throw is 5 in. and the number of revolutions is 160 per minute. This method of removing degradation material was adopted in the old breaker and proved so successful that it was reproduced in the new. These shaking conveyors deliver to a 36-in. belt which runs the full length of the domestic coal pockets and at the end has a hinged section that acts as a loading boom delivering the coal at any desired level. As the belt builds up a berm of coal across the car and discharges increments on the edge of the berm, the coal does not fall but rolls down the natural slope with minimum breakage. A telltale light for each pocket shows when the quantity of coal in that pocket has risen to such a level that it is necessary to withdraw it into cars.

As the water is not excessively acid, it is used in the breaker without neutralization. An average of 21 tons of water has to be pumped from the workings for every ton of coal mined; hence water is not lacking for coal cleaning. Every motor has a control switch conveniently situated. Klaxon horns are provided also at every motor, so that signals may be given above the din of the breaker for the starting or stopping of any unit. Motors not direct-connected are provided with V-belt drives. All bearings and eccentrics are lubricated with grease under pressure using the Ideal piping system. Trane unit heaters warm the interior of the breaker.

Provision is made for the delivery of coal to truckers, though only about 100 tons per day is thus sold. This coal, which is of domestic size and is used locally, is carried by scraper-conveyor lines across Shamokin Creek to the local sales dock alongside the main road. A new entrance road and return is being constructed on the east, or near, side of the creek for the use of big trucks demanding pea and smaller sizes.

Present production is 2,000 tons daily, but this will be increased to 3,000 tons later. Capacity of the breaker is rated at 450 tons per hour. The breaker is of steel and covered with No. 24 gage corrugated steel coated with asbestos felt and black asphaltum paint. The roofing is of No. 22 gage corrugated steel pro-

tected on both sides with asbestos felt sealed to the steel by asphalt cement.

Daily tests made by the Stevens Coal Co. show for the first sixteen days of operation the results shown in the tabulation. All testing is done on a 1.65 specific gravity except that percentages of slate and bone are determined by hand picking. Breaker refuse is tested in two lots—that is, that from the 15-ft. cone, which is in sizes pea and larger, and that from the two 10x10-ft. cones, which is in sizes buckwheat and smaller. Float at 1.65 specific gravity in the domestic refuse averaged 0.85 per cent and in the steam-size refuse 1.84 per cent during this 16-day period.

In 1780, a man named Cherry discovered the first coal found in Northumberland County. The land now operated by the Cameron Colliery was mined more than a hundred years ago. Christian Hautz sold the Rev. Robert McCartee a piece of land on Oct. 7, 1836, for $50 an acre, but at that time, it appears from the deed, some coal had already been extracted, for Mr. Hautz reserved the right to remove "the fine coal already mined." Perhaps the first coal from Cameron Colliery antedates 1836.

The mine ultimately was named after William Cameron (1795-1877), a well-known railroad, bridge, dam and canal contractor, but it did not bear his name until long after his ownership ceased, for until 1862 it was known as the Gap Colliery, being in a gap of the North Mountain. In 1872 the Mineral Railroad & Mining Co. bought the Cameron Colliery; thus it became part of the Susquehanna Collieries, which leased it to the Stevens interests.

Its first real breaker, built in 1857, was replaced by another in 1872 and again in 1882, but this third breaker was burned down the same year and the next year another took its place, one of the largest in the State. The last and fifth breaker of the series, finished early this year—that here described — is smaller but has far larger capacity and cleans the coal more completely than the rambling structure it succeeded. The marked saving in space is in the cleaning section; coal reception takes almost as much space as in the earlier breaker, so also storage in bins, for as many sizes are being made as before. About eleven men will suffice for the operation of the new breaker. The designer of the structure was M. A. Walker, who planned it to comply with suggestions of N. D. Stevens, the president, and G. H. Jones, the mine manager. It was constructed on a lump-sum contract by the Staples-Sweeney Manufacturing Co., and the Bethlehem Fabricators, Inc., fabricated and erected the 400 odd tons of structural steel.

Slate and Bone in Cleaned Coal at Cameron Colliery

Average Jan. 19—Feb. 6 (16 days)

Size	Number of Cars Tested	Per Cent Slate	Per Cent Bone	Per Cent Ash
Egg	32	0.077	0.859	.....
Stove	60	0.124	1.369	.....
Nut	112	0.466	1.929	.....
Pea	53	0.716	2.563	.....
Buckwheat.	81	.....	.....	10.54
Rice	61	.....	.....	10.43
Barley	75	.....	.....	11.69
No. 4	8	.....	.....	15.43

NEW PREPARATION PLANT

+ Tops Off Modernization Program

At Reopened Rachel Mine

OPENED IN 1917, during the World War period, and closed in June, 1934, following a fire which destroyed the surface plant, the Rachel mine, in the Fairmont, Marion County, gas field of West Virginia, now operated by the Jones Collieries, Inc., was brought back into the active list in June, 1936, following construction of a new tipple and domestic-coal plant, the acquisition of additional coal reserves and the inauguration of an underground improvement program by the new owners. The new tipple permits five primary sizes or any one of 52 combinations of these primary sizes to be loaded simultaneously on three tracks, while four sizes can be supplied simultaneously at the rate of one ton per minute from the domestic-coal plant, built to serve consumers in the immediate vicinity of the mine. With the new plant, rated capacity of the operation is 2,500 tons in seven hours, or 1,000,000 tons annually by operating two seven-hour shifts.

Possession of the property was taken by Jones Collieries, Inc., headed by Marshall John H. Jones, Pittsburgh, Pa., in January, 1936. Construction of the preparation plant was started in February. In the meantime, clean-up operations were undertaken underground, the dip sections of the mine were pumped out, all tracks were repaired and preparations were made for opening new reserves of Pittsburgh-seam coal, running 7 to 9 ft. in thickness. About 1 ft. of coal is left in the top and 3 in. in the bottom, in accordance with the usual practice in the field. The mine was opened in 1917 by E. F. Miller, manager, who returned to take over the improvement program with the change in ownership.

Main haulage roads originally were laid with 40-lb. steel and all gathering and haulage were done with battery locomotives. To reach the new coal area, lying almost due north of the shafts, a new entry, designated the Main Dip, is now being driven. This entry is made up of

four headings, one of which will serve as the new main haulage road for the mine. This haulage road will consist of 60-lb. rail on creosoted ties and construction is expected to start in May. Initial length of the haulway is 7,000 ft., and it will be extended as the workings advance. Plans call for welding all joints on this stretch of track, which will permit the major portion of the coal to be hauled downhill to the main partings by the gathering and relay locomotives.

With the completion of the new haulage road, the 10-ton battery locomotives now in main line service will be transferred to relay service and two 15-ton trolley-type locomotives will be used for main haulage to give the required capacity of 350 tons per hour to the shaft bottom. Battery locomotives originally were adopted for main-line haulage because water in the hoisting and man-and-material shafts, with consequent freezing troubles in the winter time, made it necessary to make them upcasts and consequently haul on the return. The presence of gas made it logical to adopt battery gathering when the mine was opened, and this has been continued.

Freeing Hoist Shafts of Water

Rachel mine at present is served by three shafts: a two-compartment hoisting shaft fitted with self-dumping cages, a man-and-material shaft and an air shaft. The man-and-material shaft is 350 ft. west of the hoisting shaft, while the air shaft is 200 ft. east. With the installation of new timber and water rings with collecting pipes just before the fire, the hoisting shaft was dried up, or rather the water is conducted down behind the timbers to the bottom so that it cannot drip on the timbers and freeze. Preparations are now under way to retimber the man-and-material shaft and install new water rings to dry it up also, which will permit making both shafts downcasts and allow the main haulage roads to be converted into intakes. In fact, in anticipation of trolley-locomotive haulage, this conversion already has been accomplished by the installation of Canton automatic doors to form airlocks around the two shafts and allow them to be swept with return air.

Installation of the new timbering in the man-and-material shaft will make possible the final step of converting the two shafts and the bottoms to intakes. Tentative plans also have been made for sinking an auxiliary shaft in the future about 8,500 ft. north of the present shafts to provide unidirectional ventilation, with a consequent reduction in water gage, and also for sealing off about 800 acres of worked-out territory.

Fig. 1—Rachel preparation plant. The domestic-coal plant is at the left and is connected with the main tipple by a conveyor gallery. The rescreening plant and stoker nut and slack bins appear behind the main tipple.

Although drainage is not a particularly troublesome problem at Rachel, where one 300-g.p.m. pump operating five or six hours a day can handle all the water made—principally through surface breaks—water handling has been simplified and the number of gathering pumps reduced by ditching. The ditching program was started by the previous owners before the fire, and since has been extended by the present management. At the present time, all the water is conducted to No. 7 Butt off A Face Entry by about 4,400 ft. of ditches, supplemented by one 15-hp. Weinman centrifugal-type gathering pump at 24 Butt, which relays the water from that section through a 3-in. wood line to the 7 Butt sump. Eventually, with the progress of mining along the Main Dip entry, the 24 Butt station will be abandoned and the water conducted to a new relay station by a ditch. From the present 7 Butt station the water is pumped through a 6-in. Wyckoff wood line 2,800 ft. long, which in turn discharges into a ditch 800 ft. long leading to the sump at the foot of the hoisting shaft. From there it is elevated to the surface by a 50-hp. Gould centrifugal pump.

Even the 6-in. wood line and the 7 Butt collecting station are soon to be discontinued in favor of a borehole. This borehole, 478 ft. deep and providing a 5-in. discharge, was scheduled to go into service in February. By the construction of 800 ft. of additional ditch, the water which now goes to the 7 Butt collecting station will be brought to a new collecting point under the borehole on the Main Dip entry. From the new collecting point it will be elevated to the surface by a 75-hp. 350-g.p.m. Warren centrifugal pump.

In addition to the ditches, water on the Main Dip entry from that point on will be forced to the main station by one small gathering pump and a supplementary relay pump, both 5 hp. If the ditch system had not been installed it is calculated that six additional gathering pumps and three additional pumpers would be required. As the Main Dip workings are extended it is planned to put down new boreholes at intervals and extend the ditch system to eliminate pumping the water long distances from the Main Dip territory to the main pump at the borehole.

By collecting the water at a central point and providing sufficient storage the pumping load can be shifted to the off-peak period. In fact, at the present time, by cutting, pumping and charging batteries at night and by equipping the man-and-material hoist with an ammeter registering the demand of the coal hoist, thus permitting the man-and-material hoistman to adjust his hoisting in accordance, the day demand is limited to that established by the coal hoist and the tipple, excluding certain small miscellaneous demands by shop equipment, etc. With the installation of the trolley-type main-line locomotives their demand will be added to the above, but otherwise the situation will be much the same. The fan is operated by a steam engine supplied by one boiler fired by substation attendants, who also handle, as the case may be, the car-shifting locomotive and act as watchmen. Distribution of direct current underground is based on the use of 1,000,000-circ.mil feeders.

Coal from the Rachel mine is sold

for gas, byproduct, steam, malleable and domestic use. Part of the territory already developed lies in one of the low-sulphur areas in the Fairmont field and as the Main Dip workings advance more and more of this low-sulphur area is expected to be brought into production. By segregating the output of this coal area, the company is able to offer, with present development, an output of 1,000 tons per day with a sulphur content of under 1.0 per cent. A typical analysis (dry basis) of a shipment of coal from the low-sulphur territory, made by a large steel company, shows the following: fixed carbon, 56.16 per cent; volatile matter, 37.68 per cent; ash, 6.16 per cent; sulphur, 0.78 per cent; phosphorus, 0.015 per cent. A testing laboratory report on 24-sample composite shows: moisture, 1.70 per cent; fixed carbon, 55.25 per cent; volatile matter, 36.55 per cent; ash, 6.50 per cent; sulphur, 0.83 per cent; B.t.u. (dry basis) 14,390.

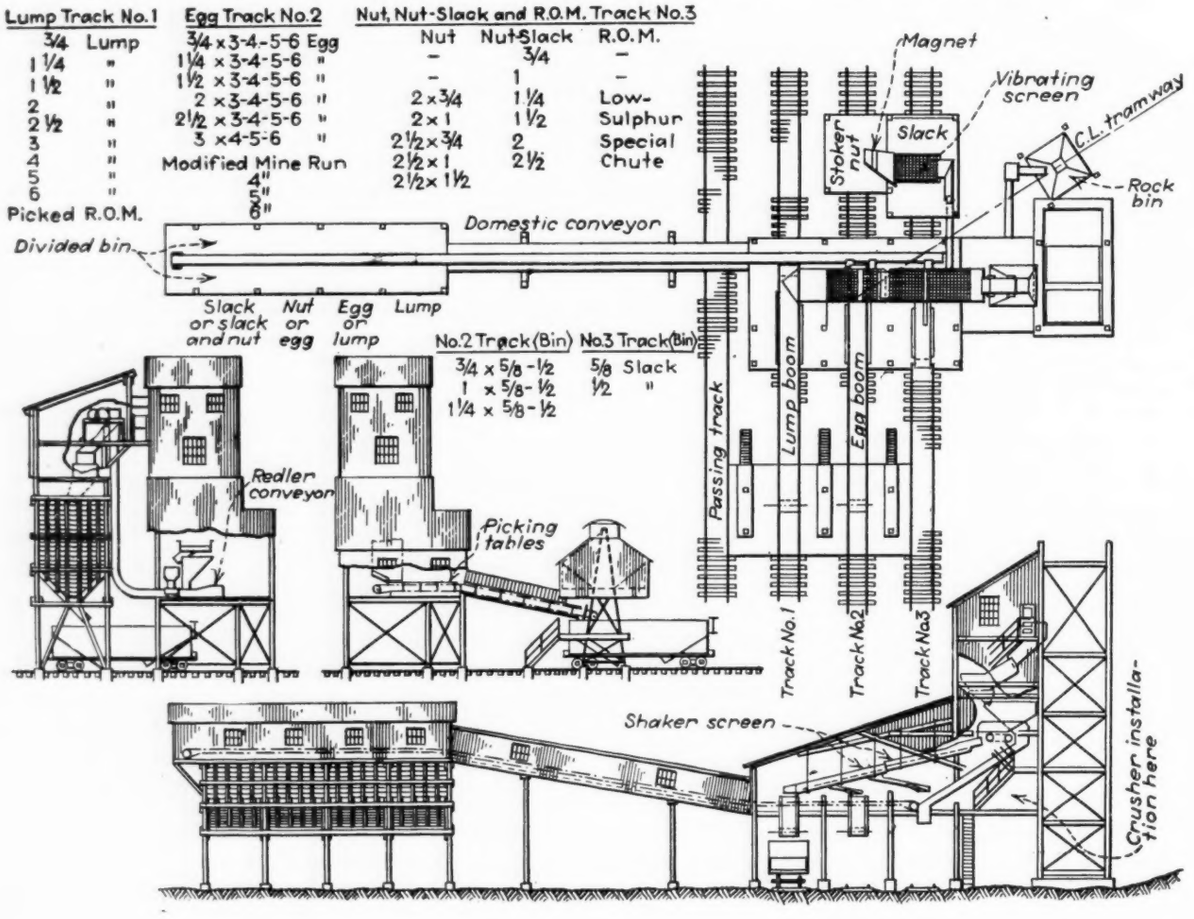
The Rachel preparation plant, as indicated above, is designed to prepare and load five primary sizes at a time—three in the main tipple and two in the rescreening and storage plant. These are: lump, egg, nut, stoker nut (pea) and slack, the latter two from the rescreening plant. With the rescreening plant inoperative, the main tipple can prepare and load lump, egg and slack. With the pea-and-slack going to the rescreener for separation into stoker nut and slack, the main tipple can produce and load lump, egg and nut. By proper manipulation of the gates on the main shaker screen and with or without the rescreener in operation, as the case may be, it also is possible in the main tipple to prepare and load a picked mine-run; lump and a modified mine-run; lump, egg and resultant; lump and resultant; and an egg-nut combination with lump and resultant. Provision also is made for running mine-run directly to the car, particularly in the case of low-sulphur coal.

Can Pick Mine-Run on Table

Lump and egg are picked and loaded over two belt-type picking-table loading booms. The lump table and boom also can be employed for picking and loading mine-run. In this case, the delivery from the screen puts the fines on the bottom and the large coal on top, facilitating picking operations. Stoker nut and slack are prepared on a vibrating screen, and the former is passed over a magnet to remove tramp iron. Preparations are now under way for the installation of a crusher and recirculating conveyor to permit breaking down the entire mine product and elevating it to the main shaker for sizing, and also for the installation of a dustless-treating system.

Both coal and mine rock or refuse are hoisted out of the main shaft. In hoisting mine rock, only one compartment is used and the rock, by means of a flygate, is chuted to an aerial-tramway-loading bin. As the tramway-loading machinery was burned in the fire, this bin is at present used as a truck-loading bin for mine rock. The tramway is to be reconstructed and new bucket-loading machinery installed, and at that time a conveyor system will be installed so that pickings from the main tipple can be brought to the tramway-loading point, if desirable. At present, these pickings, consisting

Fig. 2—Details of the Rachel preparation plant, with a list of the sizes which can be produced.



mainly of boney material with a relatively high fuel value, are run to a separate bin in the domestic-coal plant for sale to consumers in the immediate vicinity.

From the shaft, coal is dumped into a weigh basket, which in turn discharges into a hopper ahead of an apron feeder. The feeder hopper is arranged so that the coal can be run directly to the No. 3 track when loading low-sulphur mine-run. Otherwise, the feeder moves the coal out onto a double-deck 6x30-ft. Parrish-type shaker screen with flexible wooden-arm hangers. When the crusher is installed, however, the coal can be diverted from the feeder over a grizzly ahead of the crushing unit, which will be adjustable to crush to a maximum of from 6 in. down to 1¼ in. and will have a capacity of 300 tons per hour. The grizzly will permit bypassing the fines around the crusher, and a Redler elevator will be installed to carry both the bypassed fines and the crusher product back up to the main shaker for sizing. By this arrangement, as distinguished from placing the crusher at the end of a mixing conveyor or elsewhere in the system, the possibility of overloading the shaker is eliminated.

Shaker Makes Four Sizes

The Rachel shaker screen, as indicated above, is capable of making either three or four primary sizes, depending upon whether or not the rescreening plant is in operation. The bottom, or carrying, deck of the shaker is fitted with simple slide gates to permit making the various combinations. These slide gates are made in pairs, one of a pair, as indicated in Fig. 3, being pushed in from one side of the screen and the other from the opposite side. When the rescreening plant is idle, lump and egg go onto their respective picking-table loading booms, while the resultant is chuted to the car. When making stoker nut and slack in the rescreener, the slack chute becomes the nut chute. However, provision has been made in the design of the tipple for the installation of a third picking-table loading boom to prepare and load the nut size.

Pea-and-slack for subsequent treatment in the rescreener are chuted from the upper end of the main screen to a 17-in. Redler conveyor-elevator with a capacity of 160 tons per hour, which carries the coal up to a Ladel 6x10-ft. double-deck vibrating screen set over the slack bin. Stoker nut is made on the two screening decks, the coal from both being combined in a chute leading to the stoker nut bin. This chute is equipped with a Central Electric chute-type magnet with auxiliary 125-volt d.c. motor-generator set to trap out any tramp iron in the screen product. Slack through the bottom deck of the vibrator runs directly to the slack bin. Both the stoker nut and slack bins have a capacity of 75 tons of coal, and the former is equipped with a lowering device to direct the coal to the sides to facilitate loading. The vibrator used provides plenty of screen area to assure efficient separation when the coal is damp.

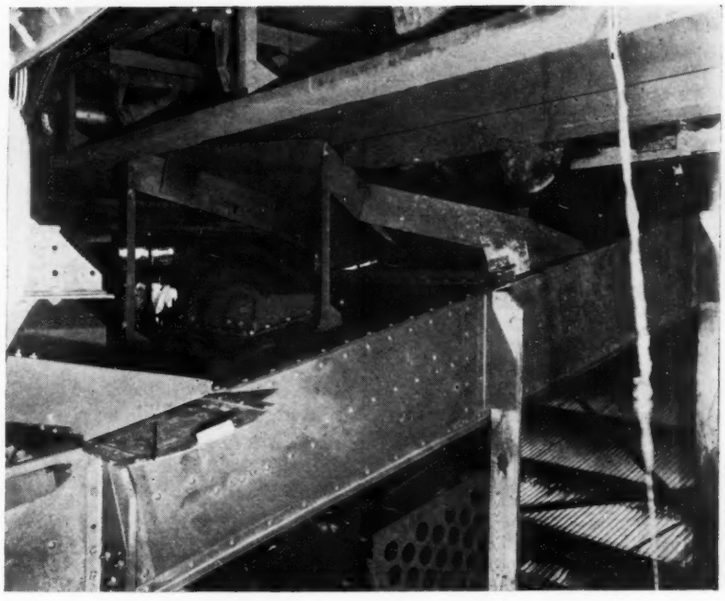


Fig. 3—View of the underside of the lower section of the main shaker showing, on the far side, the side-discharge chute for taking egg off the screen to the domestic-coal belt, and, upper right, near side, a slide partly in place.

Both the stoker nut and slack sizes will be dustless-treated, the type of treatment to depend upon the system of keeping down dust finally adopted for the plant. Two alternative plans are now under consideration, one involving the installation of hoods, ducts, an exhaust fan and a cyclone precipitator discharging into the slack bin, in which case special dustless-treating equipment will be installed for the stoker nut and slack sizes, and possibly for the nut, egg and lump sizes, as well. The other plan contemplates the installation of oil-spraying equipment to treat the mine-run as it comes into the plant with about 2 qt. of oil per ton, which will serve to reduce dust emission and at the same time provide a reasonably dustless nut, egg and lump. Then the stoker nut and slack would be given an additional application of oil in the rescreening plant to bring the total up to about 4 qt. per ton and assure a dustless product in both cases.

The domestic coal plant at Rachel consists of four 25-ton truck-loading bins and a fifth smaller bin now used for boney. As indicated in Fig. 2, the bin structure is approximately in line with the main shaker in the tipple, which permits the receiving end of the belt conveyor serving the plant to be placed alongside the main shaker and parallel with it. Length of the belt is 152 ft. center to center of pulleys. Placing the receiving end of the belt parallel with the shaker facilitates taking off the various sizes to be run to the domestic bins. These sizes are taken off one at a time by means of side-discharge chutes equipped with slide gates similar to those described above. These gates, however, are single, as compared with the double gates used in mixing, and the side-discharge chutes extend only half way across the carrying deck of the screen (Fig. 3), thus taking only half the size being run to the domestic-coal plant at the time.

Domestic bins have a capacity of 25 tons each. The belt conveyor is flattened for the entire length of the bin structure, and the coal is taken off by taking out removable sections of the skirt boards and scraping it off by a plank or plow, the latter made at the mine primarily for taking off lump and egg. Following out the principle of designing all parts of the plant to permit changes from time to time as they become necessary, the bins are made so that they can be fitted later with shaker-type feeding and degradation screens, with the degradation going to a conveyor system leading to the slack pocket.

MILLFIELD MODERNIZES

+ Tripling Its Hourly Capacity

By Changes That Speed Haulage

By FRANK G. SMITH
Assistant General Superintendent
Sunday Creek Coal Co.
Nelsonville, Ohio

INCREASING the tonnage from 1,000 in eight hours to 3,800 in seven hours and then to 5,500 in fourteen hours, but using the same hoisting facilities, was accomplished at Millfield No. 6 mine of the Sunday Creek Coal Co., Athens County, Ohio, by a series of improvements extending over a seven-year period since the mine was taken over. An addition to the tipple; aerial-tram refuse disposal; new fan; shaft relined; man hoist installed; main bottom rebuilt; 425 new steel cars; brick and steel protection for the main haulways; heavier track—thus reads the list of principal items.

The Sunday Creek Coal Co. at present operates seven mines with a daily capacity of approximately 11,000 tons and has been in the business of producing and selling coal for over 50 years. Millfield mine, which is on the New York Central R.R. nine miles north of Athens, Ohio, in the Sunday Creek district, is in an area of the No. 6, or Middle Kittanning, seam, averaging over 72 in. in thickness, lying practically level and having 200 to 300 ft. of cover. The mining method in so far as pillar recovery is concerned is limited by these factors: more than one stratum of exceedingly strong and heavy sandstone over 20 ft. above the coal and a lack of surface rights which would entail the purchase of farm lands ranking from marginal to fair.

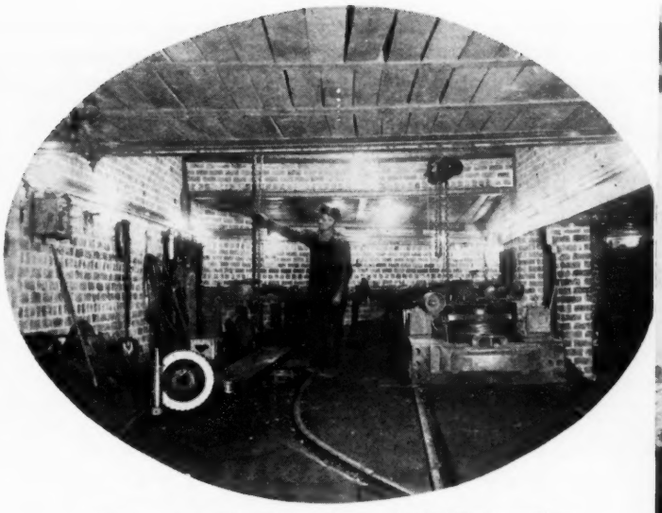
Millfield No. 6 was opened through a 200-ft. shaft in 1912. Approximately 1,800,000 tons had been shipped when the present organization took over the property in 1929. As of this year, the projected remaining life of the mine is about 25 years. Steam generated in the original hand-fired return tubular boilers operates the car hoist and fan, but purchased power operates all other equipment. The coal is top cut and all gathering is done with six-ton locomotives equipped with crab reels. Loading is entirely by hand.

Improvements were made strictly in the order of necessity and each has had to pay its way, so to speak. At no time during the period of development was the operating cost allowed to get out of line with other mines in the field. First, the tipple was improved to assure better preparation; next, the aerial tram was installed to dispose of increased refuse; then the replacement of mine cars was begun in order to increase production. To relieve the coal hoist of auxiliary duties and provide safer operation a man hoist was installed in the third compartment of the hoist shaft and at that time the entire main shaft was retimbered. Handling of sand was simplified by the use of a borehole feeding directly to the inside and later enlargement of the sand house. In addition to rebuilding the main bottom and haulways, underground improvements include a new shop and fireproof housings for substations consisting of 275-volt 150-kw. synchronous converters.

The work of improving and enlarging this property began in April, 1930, when work was started on the tipple and aerial tram. A new boom house was constructed and a loading boom added to take care of the nut product. In addition, mixing conveyors were installed to permit the loading of picked mine-run. At the same time the tipple structure was rebuilt and strengthened in part and the old shaker screens were replaced by a larger and more efficient unit. The aerial tram was built by Broderick & Bascom and includes a bucket having a capacity of 45 cu.ft. The 1⅞-in. track rope is 1,640 ft. long, supported by one intermediate tower. Motive power is provided by a 50-hp. slip-ring motor. This whole unit was planned to take care of all possible demands arising out of increased production and at present handles all refuse without difficulty.

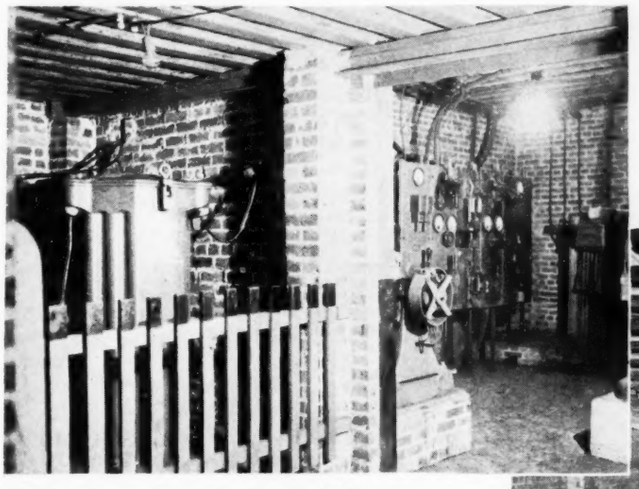
During this same year 200 steel cars were constructed in the company's shops at Corning, Ohio. These cars are of the end-dumping type, having stub axles and roller bearings as well as spring bumpers. No changes have been made in these cars since the first were built, with the exception of some improvement in the brake mechanism whereby wire rope was replaced by a set of steel levers. This change eliminated any possibility of brake failures. These cars have a capacity of at least 3½ tons.

No major improvements were made in 1931 with the exception of the installation of a 6-ft. Jeffrey centrifugal fan to exhaust air at the Fifth North air shaft, shown on page 154. This was done to reduce the load on the main fan brought about by the distance of the workings from the main shaft. As the mines were working very little in 1932, no improvements of any importance were made in that year. During the period just discussed, inside improvements included the completion of the Main North haulage road, which necessitated considerable brick and steel roof support; the completion of the Nineteenth West switch, with a capacity of about 60 cars, and the erection of an inside repair shop on this switch. During this whole period



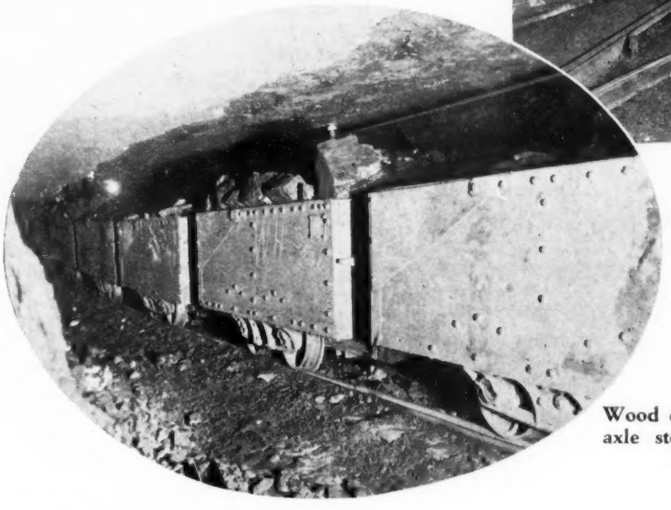
Two motor pits with I-beam chain-block trolleys and a few tools, including a lathe (in an alcove at the right), constitute the equipment of this new underground shop in the East section

In the background appears the intermediate tower of the aerial tram which was installed to dispose of refuse



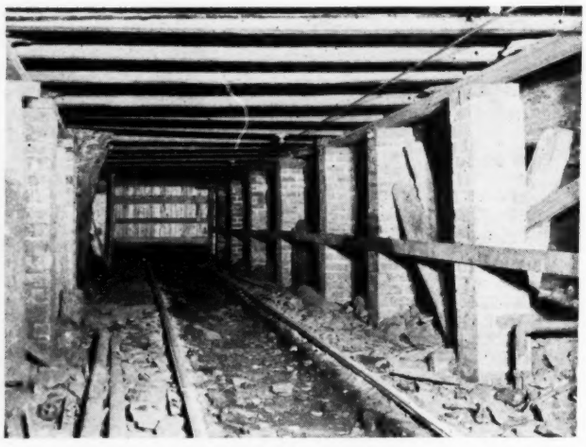
Brick walls, a ceiling of rails with bricks between and the transformers in separate compartments feature the new underground substation rooms

In rebuilding the main bottom the rails were laid on a solid floor of 4x6-in. timbers; the sides were bricked, and the top was protected by 12-in. H-beams



Wood cars were replaced with 450 four-axle steel cars of 92 cu.ft. water-level capacity; weight, 3,000 lb.

By a series of improvements extending over seven years, the capacity of Millfield No. 6 mine was raised from 1,000 to 3,800 tons per shift

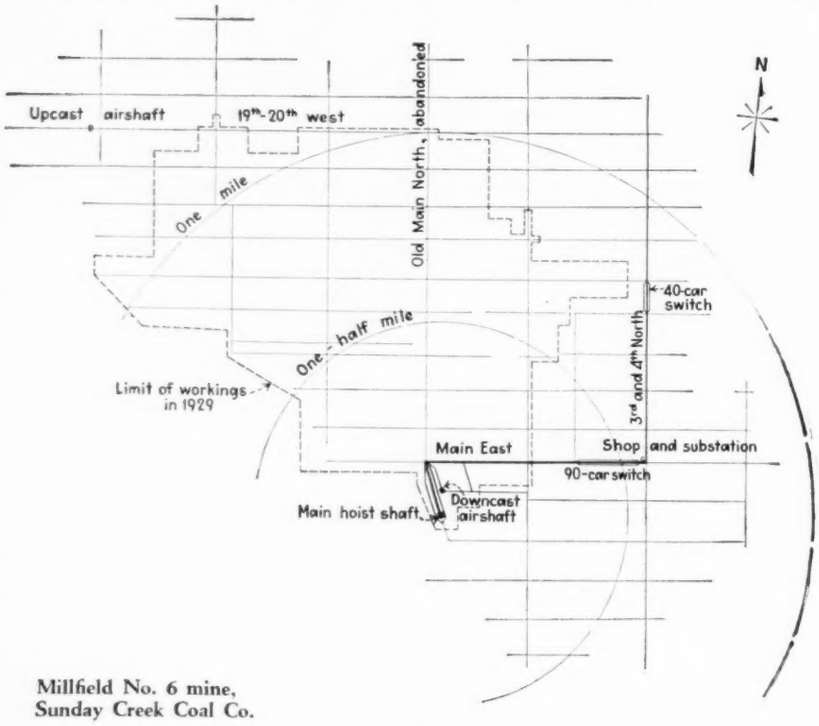


Except guard rail at right (used only in certain places), this brick and steel timbering is typical of construction used to protect main handways

all of the work in this mine lay north and west of the main bottom.

Early in 1933, however, it became apparent that the territory being mined at that time would soon be exhausted through increasing production. It then became necessary to clean up the old First East entry, which had been abandoned by the previous operating company, in order to provide a means of ingress into undeveloped acreage. This old entry was cleaned up, put on grade and tracked with 70-lb. rail for a distance of approximately 1,600 ft. Three entries were then picked up and driven on east and a 90-car three-track switch made between the First and Second and Third and Fourth South entries. During this same period, 100 additional steel cars were built. An additional 125 cars early in 1934 brought the total to about 425. Down to the present time these cars have been ample for all coal produced at this mine. Slate, however, has been handled in some wooden cars which have been kept at the mine for this purpose.

Early in the summer of 1934 the mine was shut down for the purpose of retimbering the main hoist shaft. During this period of idleness, the main bottom was rebuilt, replacing old "I" beams with 12-in. "H" beams supported on brick walls. The track also was taken up and replaced with 70-lb. rail laid on a solid flooring of oak timbers. All old switch stands were removed and replaced with overhead switch stands in order to remove any possible hazard to the bottom men. At the same time the egg boom in the tipple was replaced by a wider boom in order to facilitate preparation. The present boom is 60 in. wide. Also the main fan, rapidly becoming inadequate, was replaced by a 7-ft. Jeffrey centrifugal fan, driven by a 124-hp. Ridgway steam engine. Between the engine and the fan pulley a 100-hp. slip-ring motor was installed so that electric power can replace the steam power for this fan in less than three minutes.



Millfield No. 6 mine, Sunday Creek Coal Co.

In retimbering the shaft, guides were placed in the third compartment of the hoist shaft and a cage was installed to hoist men only. This man cage is operated by means of an electric hoist rather than steam and carries 24 men. In the case of all cages at this mine the weight of the cages plus the weight of the cars is carried on balance ropes, thereby relieving the hoists of all weight except the actual coal handled. In addition, this eliminates costly accidents which might possibly arise in the event of a broken hoist rope.

In the autumn of 1934 it was found that the amount of work transferred into the east side of the mine required too much air for the capacity of the old entries through which the air must be passed. Accordingly, a straight aircourse 3,200 ft. in length with a minimum of 75 sq.ft. of area was provided by cleaning up an old entry and driving an additional 1,600 ft. of entry. This aircourse was timbered throughout with steel and creosote-treated timber. At the same time the new repair shop was con-

structed on the Main East switch and two rotary converters were installed in the adjacent substation.

Because of the rapid extension of the workings it became necessary in 1935 to connect the Third and Fourth North entries through to the Nineteenth and Twentieth East entries shown on the accompanying map. This was completed in that summer to provide a new haulway into the north and as an additional aircourse for the north end of the mine. At that time a 40-car switch was laid on this entry to facilitate haulage out of the northeast portion of the mine. In 1936, the only major improvement was the enlargement of the reservoir to provide adequate water for the boilers to meet increased load arising out of the double shifting of the mine and consequent increase in production.

During the period from 1933 to 1937, therefore, not only has production increased from approximately 2,000 tons per eight-hour shift to 5,500 tons in fourteen hours but virtually no entry or working place driving or being used as a haulway at the beginning of this period is now in use. In other words, as far as the underground workings of this operation are concerned, a whole new mine capable of a maximum production of 3,800 tons in seven hours has been made. As a result, it was unnecessary to replace two of the company's large mines which became exhausted during this period. Moreover, no great increase in plant was necessary.

At present all coal is cut with top-cutting arcwall machines and gathered by means of a six-ton Jeffrey motor. Main haulage is handled by ten-ton locomotives, three in number, operating on 70-lb. rail on main hauls and 40-lb. rail on intermediate hauls. All new main-line work is laid on 4x6 in.x5½-ft. creosote-treated ties. Timbering on main hauls at Millfield has always been a problem, but adequate protection has been provided by frequent use of steel cross beams supported on brick pillars. All main aircourses now are protected by steel rail hitched in the ribs. Hitch holes are no longer made by hand but through the use of a Goodman hitch-hole digger.

No new construction is contemplated at present so far as the outside is concerned. However, because of the rapidity with which territory is being exhausted, it will be necessary to drive entry in the summer and go through a 1,000-ft. fault, thereby opening up several thousand acres of undeveloped coal land. Market conditions resulting in a very highly seasonal production have necessitated careful schedules of improvements. It has been necessary to build up the property each spring and summer in anticipation of the larger tonnages which the market demands during the winter months.

FIRELESS COOKING

+ Makes Smokeless Fuel and Byproducts

At 20-Ton Plant, Tacoma, Wash.

By JAMES E. LOUTTIT

Consulting Engineer
Tacoma, Wash.

Inner retort removed, showing 750 lb. of char from blend of Washington State coking and non-coking coals

STEAM, which enters a superheater at a pressure of only 10 lb. per square inch or even less and is heated to a final temperature of 1,200 deg. F. and delivered at 4 lb. pressure or lower, is used for the carbonization, or low-temperature distillation, of coal in the Coalene process developed by E. H. Records and the author as co-inventors. The coal is carbonized by the steam in the inner chamber of a retort and, after its distillation, a crane lifts out the carbonized material, still glowing and shrouded by this inner container. In due time, this container is lifted from around the char, which is then allowed to cool before being broken to domestic sizes. The operation is intermittent, not continuous.

At first, only a single retort was used, capable of treating 750 lb. of coal per cycle; but today a four-retort plant, the retorts working on an interlocking cycle, is being operated at Tacoma, Wash., with each retort having a capacity of 1,000 to 1,200 lb. of coal. This plant will treat 15 to 20 tons of raw coal every 24 hours. Over a period of years, modifications and improvements have been made to the plant, and these have added greatly to its operating economy.

As the present plant is regarded as a unit, further increase in tonnage capacity will be obtained by adding other units as desired. Boiler, condenser, gas and byproduct equipment are so incorporated into the flowsheet that standard parts as made by many machinery manufacturers can be used in the construction of the plant.

In developing processes for the

low-temperature distillation of coal between 1,000 and 1,300 deg. F., some designers have concentrated on the production of smokeless fuel, or char, others on a maximum of tar oil and gas; but the object sought in this process is not alone to realize these objectives but to obtain also an oil that, with standard distillation methods, will produce a maximum of the lighter hydrocarbon oils suitable for motor fuel, and do so without excessive pressure or heat and in as short a time as possible.

After several gases had been rejected as the means of carrying heat to the coal, superheated steam was chosen as the preferable heat-transfer medium. Test of a wide range of coals demonstrated that an intermittent cycle of operations would afford the highest efficiency and yield the greatest percentage of product recovery with coking and non-coking coal alike. With such a cycle, the size of the retort could be regulated to suit the input desired, and no machinery was needed to operate the retort or to stir the material within it, thus simplifying its operation.

For the sake of economy and because low-ash char is attractive to the domestic consumer, the coal selected for treatment by this process should be as low in ash and moisture as possible. Higher-ash coals also can be treated effectively by this process with a profit, in many locations, from byproduct recovery, but the product thus obtained should be diverted to industrial channels or to plants where mechanical firing is available. The type of coal best suited for treatment must be considered from the standpoint of the market available to any specific plant.

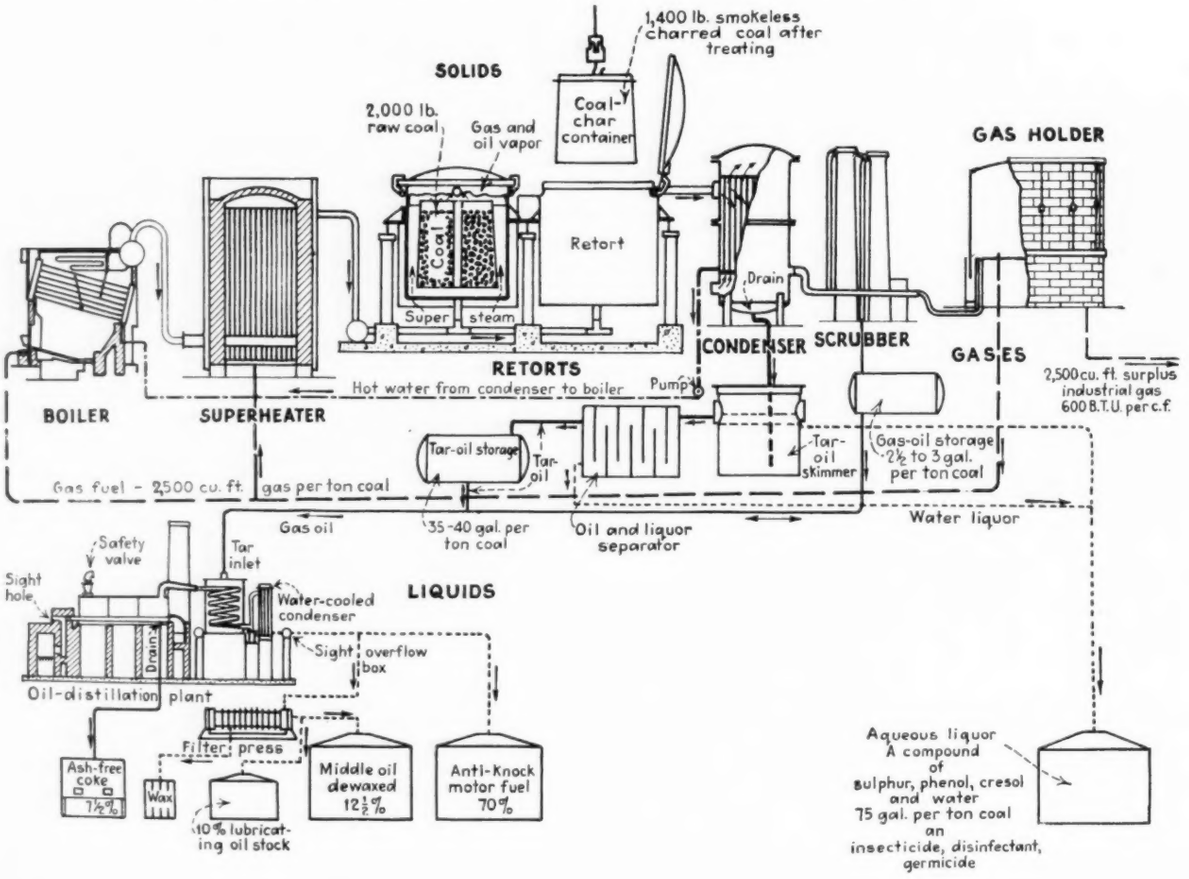
Steam Permeates Charge

The retort consists essentially of an outer and inner container, the former being so designed that it becomes an expansion receiver for the superheated steam. The inner container carries the entire coal charge, and perforations and steam ducts placed in the most effective positions assure that all parts of the coal will be rapidly brought to the desired temperature. As soon as the coal has been distilled, the inner container is easily and quickly removed and another full of raw coal substituted.

Neither of these containers has any moving parts, nor are they in contact with external or internal open flame. Thus, the construction of the retort proper is simple and inexpensive. Its shells are made of sheet steel of medium weight with sustaining rings and covers of wrought iron welded in place. In operation, the retorts have been found to hold their shape without warping or distortion; thus upkeep and depreciation costs are low. An overhead crane deposits the container within the expansion chest and removes it after treatment and cooling. After the stream of superheated steam is shut off, the char cools.

Steam may be generated in any suitable boiler unit, but, contrary to usual practice in general processing, its pressure is reduced as it issues from the boiler prior to its entry into a special type of superheater, which obviates the need for expensive alloy tubes. Operation over a period of months has demonstrated the effectiveness and stability of this heating device. The superheater used at the Tacoma plant receives steam at

Flowsheet of two-retort distillation unit. Aqueous liquor consists of sulphur, phenol, cresol and water—75 gal. per ton. Used as insecticide, disinfectant and germicide.



10 lb. gage or under and raises its temperature to 1,200 deg. F., using heat derived from the surplus gas of the process. It has been found desirable to allow the steam to expand considerably, without, however, loss of superheat.

From the superheater, the steam, now having the general characteristics of a gas and at a pressure of about 4 lb. per square inch, is conducted into the retort steam expansion chamber through a welded steel header equipped with volume control and cut-off valves. Rapid expansion of the superheated steam as it is slowly conducted through the coal aids rapid reactions, and all gases as they are evolved are promptly swept free of the coal mass.

The dome of the retort receives the evolved tar vapors, which, through temperature and pressure regulation, are given free opportunity to separate into oils and gases. The temperature of the dome gas rises in an even and steady curve, commencing at about 200 deg. F. upon first entry of the superheated steam and ending at about 700 deg. F. upon completion of distillation. From 0.7 to 1.0 lb. of steam is needed per pound of coal treated. The cycle of operation in each run takes from one to three hours, depending on the coal being distilled.

Vapors and gas are conducted from the retort dome to atmospheric and water condensers of standard design. Scrubbing of the non-condensible gases with standard equipment produces a clean illuminating gas and recovers the gas oil.

Blend Makes Solid Mass

When coking coal or a combination of coking and non-coking coal is used as an initial raw product, the char emerges from the retort in a solid mass which can be sized for any particular requirement. Non-coking coal, such as lignite or subbituminous coal, retains its natural form and size. Many so-called non-coking coals have been treated and found to have a slight tendency to coke under this process. Although they do not become highly porous like full-coking coals, their external appearance after treatment is similar. A bituminous coal of the following typical analysis will be used to indicate recovery values:

Proximate Analysis Raw Coal

(40 per cent, Wilkinson Seam Coal — coking)
(60 per cent, McKay Seam Coal — non-coking)

	Per Cent
Moisture	8.49
Volatile matter	35.95
Fixed carbon	48.44
Ash	7.12
B.t.u.	12,092

Furnace size smokeless char from Washington coals

Proximate Analysis of Char From Above

(From Storage Bin)

	Per Cent
Moisture	2.4
Volatile matter	13.9
Fixed carbon	72.9
Ash	11.5
B.t.u.	13,775

Recoveries of Crude Products

Char (solid smokeless)	1,300 lb.
Primary tar oil	32 gal.
Gas, 600 B.t.u. per cu.ft.	5,000 cu.ft.
Gas-oil	3 gal.

Thermal Balance

	Per Cent	B.t.u.
Input:		
2,000 lb. raw coal @ 12,092 B.t.u.	90.3	24,184,000
1,800 lb. steam @ 1,438 B.t.u.	9.7	2,588,000
	100.0	26,772,400
Recovery:		
1,300 lb. char @ 13,773 B.t.u.	66.9	17,904,900
32 gal. tar oil @ 140,000	16.7	4,480,000
5,000 cu.ft. 600, B.t.u. gas	11.2	3,000,000
3 gal. gas-oil @ 160,000	1.7	480,000
	96.5	25,864,900
B.t.u. lost and absorbed	3.5	907,500
		26,772,400

Of the 3.5 per cent heat loss, much is recovered by returning the hot condenser water to the boiler-feed pumps.

The primary tar or tar-oil produced from a ton of raw coal will give yields that vary with the volatile content of the coal. Its physical character is similar to Eastern crude oil and is definitely of paraffin base. In general the production of tar-oil has averaged from 30 to 35 gal. per ton. In the preceding tables, a particular type of coal has been chosen, but the yields are such as may be expected under average conditions from the process. Much of the type of coal chosen has been treated and the average is computed from yields over a period of time. Certain coals high in volatile and low in ash and moisture have yielded as much as 40 gal. of tar-oil.

By our method of handling, preliminary distillation of the primary tar-oil, per unit of 31½ gal., yields the following fractions:

Deg. F.	Cut	Per Cent by Volume	Gal.
0 — 600	Distillate *A*	75 to 77	26.25
600 — 700	Distillate *B*	15	5.25
Residue	Coke	10	....
		100	31.50

Upon recycling of distillate *A* the following fractions were obtained:

Deg. Baumé	Sp. Gr.	Volume Per Cent	Gal.
58	0.74	50	13.22
40	0.82	30	7.78
27 plus	0.89	12	3.15
Residue	....	8	2.10
		100	26.25

Distillate *B* under redistillation and treatment gave the following results:

Deg. C	Character of Fraction	Volume Per Cent	Gal.
90 — 240	Phenols	6	0.32
240 — 310	Cresols	38	2.01
310 — 340	Middle oils	21	1.10
340 — 370	Heavy oils	17	0.89
370 — E. P.	Wax fraction	17	0.89
		99	5.21

By stripping the gases after separation of the tar oil a yield of 2½ to 3 gal. of gas oil high in benzol equivalent was obtained per ton of coal treated.

An average of 5,000 cu.ft. of combustible gases is evolved from each ton of coal processed, this gas having the following average analysis:

Gas		Per Cent	B.t.u.
Carbon dioxide	CO_2	7.0	Inert
Illuminants		5.7	134
Oxygen	O_2	0.7	Inert
Hydrogen	H_2	21.8	70
Carbon monoxide	CO	8.8	28
Ethane	C_2H_6	17.2	298
Methane	CH_4	35.2	350
Nitrogen	N_2	3.5	Inert
		100.0	880

The above gas is exceptionally low in inert gases such as nitrogen, oxygen and carbon dioxide—an advantage derivable from the distillation and condensing control which this process makes possible.

SEALING PROJECTS

+ Sharply Reduce Stream Pollution From Abandoned Mines

By PERRY A. FELLOWS

Assistant Chief Engineer
Works Progress Administration
Washington, D. C.

MINE-SEALING projects carried on by the Works Progress Administration have resulted in the sealing of over 1,000 abandoned bituminous operations and the closing of more than 47,000 separate openings in Pennsylvania, Ohio, West Virginia and Kentucky since a cooperative campaign to reduce stream pollution from acid mine-water discharge was launched late in 1935. Actual tests before and after sealing show reductions of not less than 50 per cent as a minimum to well over 90 per cent in many cases in the sulphuric-acid flow from the abandoned mining properties.

The problem of stream pollution and the part played in it by mine-water discharge is an old one. Government agencies have been studying the question for years. R. D. Leitch, chemical engineer, U. S. Bureau of Mines, in 1928 reported that it seemed likely that "sealing abandoned mines would result in decreasing the acidity of drainage from them sooner than if they were allowed to remain open."[1] The evidence seemed conclusive, he declared two years later, that sealing worked-out or abandoned sections inhibited acid formation. Considerable trouble and expense could be saved operators, he pointed out, if areas from which drainage was normally acid were sealed as soon as worked out or abandoned.[2]

Thus, while the problem was recognized and sealing conceded to be the only practical answer, officials of the four States named were in a quandary as to how to mitigate the serious health menace and enormous economic losses attributable to stream pollution, because State laws seemed to offer no avenue for effective action. Here Uncle Sam stepped in. At a conference of health officials of these States in the autumn of 1935, Surgeon-General Hugh S. Cumming proposed that they submit mine-sealing projects to the Federal Emergency Relief Administration. Projects thus formally submitted by the Ohio River Board of Health Commissioners in October were quickly approved and in operation by Dec. 1. When WPA was formed, arrangements were made to carry the work forward.

Positive evidence is now being received from many sources that these projects have achieved amazing results in ameliorating the health menace and in reducing direct financial losses. Many cities and towns in the affected areas report an appreciable reduction in the cost of treating public water supplies. Where new waterworks construction is contemplated, sanitary engineers hope to be able to build at much less cost than formerly was the case, when expensive special acid-proof materials were necessary. Railroads and industrial plants report reduced cost of water treatment.

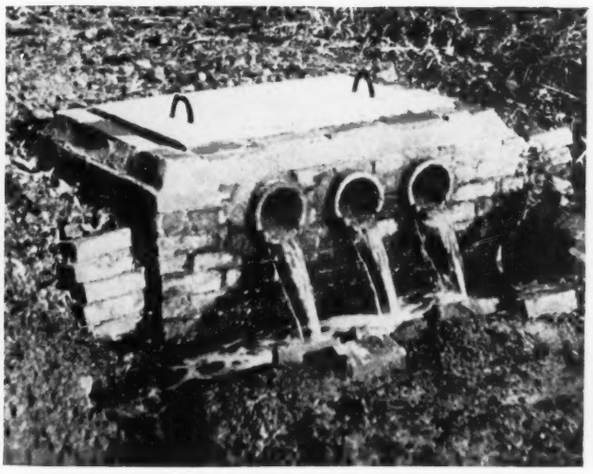
Recreational use of some streams has been restored and other streams are being cleared up rapidly. Sponsors of the projects are certain that time will reveal other benefits from the reduced flow of sulphuric acids from the abandoned mines. They believe disintegration of metal and concrete culverts and bridge abutments will be greatly diminished, if not eliminated. They know that stock watering in some of the streams has been resumed and they are certain that grazing will be resumed along a number of other streams as the program goes forward.

Owners of steamboats plying the Ohio believe that corrosion of metal hulls resulting from action of the acid on places where the metal is scraped clear of paint or other protective coating in low water will be

Cistern overflow air trap

[1] Report of Investigations, Bureau of Mines No. 2895.
[2] Report of Investigations, Bureau of Mines No. 2994.

Erosion channels from subsidence need water diversion



Cover traps to keep out leaves and forest rubbish

greatly lessened. Officers of the Corps of Engineers believe the future will show much less damage from the acid to the federally owned dams built to aid navigation along the Ohio and that expenditures for repairs will be appreciably lowered.

The first step in the mine-sealing projects submitted by the Ohio River Board of Health Commissioners was the making of surveys of the mining fields. Many of the abandoned mines were not shown on geologic maps and it became necessary to inspect the coal regions to find not only the mines but also outcrop holes and crevice openings, for it was obvious that unless all the openings were closed the mere sealing of the mine entrance would do no good. From one to more than 700 openings to each of the mines were found by the searchers.

One operation near Latrobe, Pa., had more than 700 openings and 18,000 ft. of crevices. These have been closed and a native stone wet seal erected at the entrance. Tests made before sealing showed this mine was discharging on the average more than 3,000,000 gal. of water a day containing 2,300 lb. of acid. Tests made after sealing show that it drains less than 100,000 gal. of water, containing less than 100 lb. of acid.

The survey or data obtained from previous investigations showed the following to be the estimated sulphuric-acid drainage from abandoned mines along tributaries of the Ohio River:

State	Drainage of sulphuric acid in pounds per day
Pennsylvania	5,000,000
West Virginia	1,877,300
Ohio	2,700,000
Kentucky	2,848,545
Total	12,425,845

After the surveys were completed, actual work was started. On large jobs crews of about 30 men were employed. On the smaller jobs, six men usually were employed for each, although in West Virginia it was found more practicable to limit crews to five.

Safety measures for the protection of the men were emphasized by WPA. The supervisor and district engineer were required to agree in advance on safety measures for each job undertaken and it was the task of the supervisor to see that they were followed. Foremen were required to make sure that no gas was present in the workings and to make a test for gas each day before the men went to work. The men were to be supplied with the proper tools, which were to be kept sharpened. Goggles, life lines and gas masks were to be supplied when necessary and boots were always provided when the men had to work in water.

Underground workings were kept well timbered; ditches were to be kept carefully shored; and hand rails were to be provided on all bridges and walk-overs. Steps were to be cut on all steep grades, especially where material went up or down. The shotfiring was to be done by competent men, preferably by the use of detonators and electric batteries. In all cases, first-aid kits were to be available. The result has been an exceedingly low number of casualties.

In Pennsylvania, the projects gave employment to 1,700 men, most of them unemployed miners eligible for WPA employment; in West Virginia, 500; in Ohio, 600; and in Kentucky, 800. The labor of these men represented almost the total cost of the projects. In Pennsylvania, for example, 96.4 per cent of the money expended went to workmen.

The surveys had shown that originally there were 4,100 abandoned mines to be sealed in Kentucky; 4,500 in Ohio; 3,450 in Pennsylvania and an estimated 3,800 in West Virginia. At last reports, the following has been accomplished:

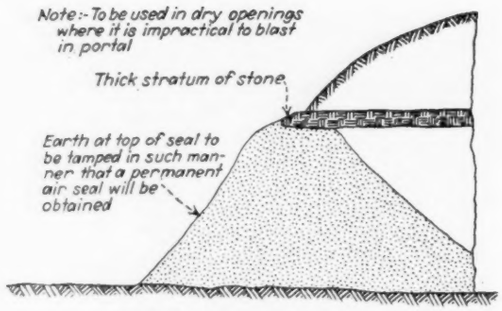
State	Mines Sealed	Openings Closed
Kentucky	124	652
Ohio	184	13,000*
Pennsylvania	208	30,000*
West Virginia	507	3,644
Totals	1,023	47,296

*Estimated

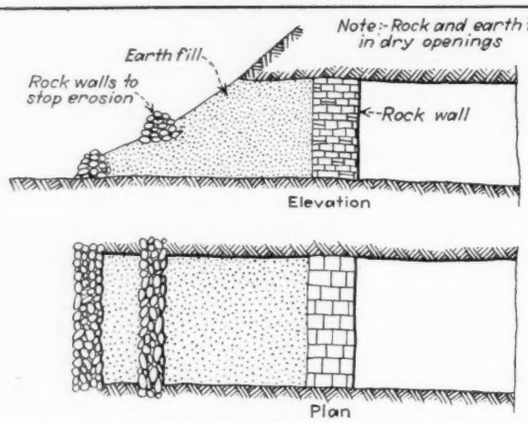
More than 90 per cent of the mines had drift openings. Shaft mines offered little difficulty, as a rule. They were simply blown out. However, this method sometimes was objected to by landowners, both surface and subsurface, especially where active mining was still being carried on in the neighborhood. Some mines were so small that it was possible to seal them simply by filling, with ashes or earth. In other cases there were so many outcrop holes to be filled that the engineer in charge simply ordered a job of landscaping. Not a few farmers found themselves by this process of an acre or more of tillable land reclaimed from land formerly unfit for use.

Methods of construction of the seals varied with the topography of the land in which the mines were situated, and native materials were used wherever possible. However, following are some of the better known methods used for wet sealing after all openings had been closed except the one through which the drainage flowed (if there were more than one drain from a mine, engineers arranged to cut them together):

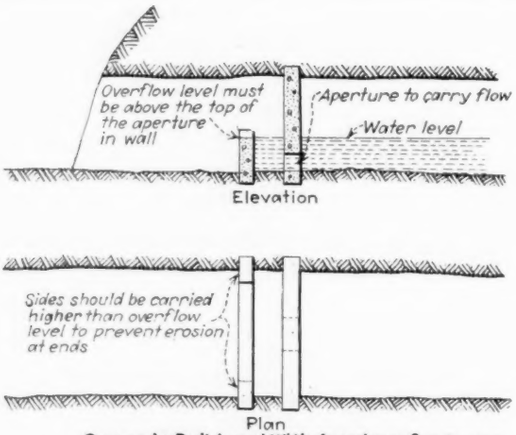
1—Erect curtain wall with trap


Note:- To be used in dry openings where it is impractical to blast in portal
Thick stratum of stone
Earth at top of seal to be tamped in such manner that a permanent air seal will be obtained

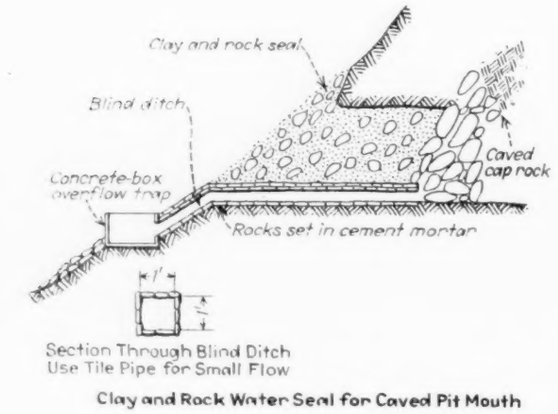
Earth Air-Trap Seal for Dry Openings



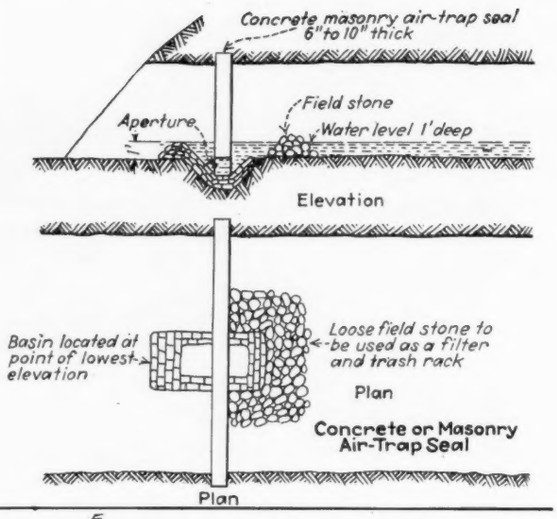
Rock and Earth Fill Air-Trap Seal


Overflow level must be above the top of the aperture in wall
Aperture to carry flow
Water level
Elevation
Sides should be carried higher than overflow level to prevent erosion at ends
Plan

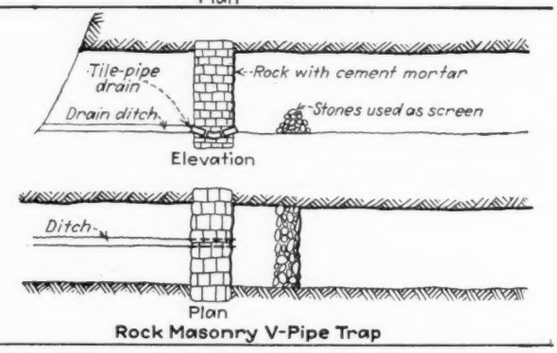
Concrete Bulkhead With Aperture for Large Volume of Water and With Dam to Create Seal



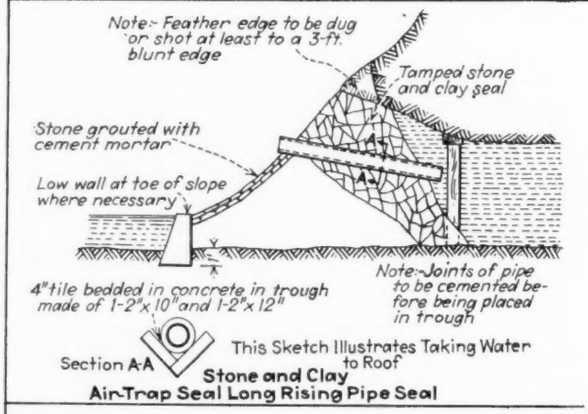
Clay and Rock Water Seal for Caved Pit Mouth


Concrete masonry air-trap seal 6" to 10" thick
Aperture
Field stone
Water level 1' deep
Elevation
Basin located at point of lowest elevation
Loose field stone to be used as a filter and trash rack
Plan
Plan

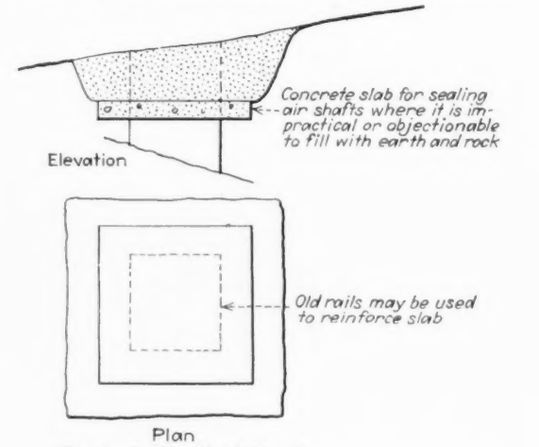
Concrete or Masonry Air-Trap Seal



Rock Masonry V-Pipe Trap


Note:- Feather edge to be dug or shot at least to a 3-ft. blunt edge
Tamped stone and clay seal
Stone grouted with cement mortar
Low wall at toe of slope where necessary
4" tile bedded in concrete in trough made of 1-2"x10" and 1-2"x12"
Note:-Joints of pipe to be cemented before being placed in trough
Section A-A
This Sketch Illustrates Taking Water to Roof

Stone and Clay Air-Trap Seal Long Rising Pipe Seal


Concrete slab for sealing air shafts where it is impractical or objectionable to fill with earth and rock
Elevation
Old rails may be used to reinforce slab
Plan

Concrete Air-Shaft Seal

TYPES OF SEALS USED IN WPA PROJECTS

formed by an opening through the wall at the bottom and force the mine drainage to flow over two short walls (one on either side of the curtain wall) whose tops are higher than the curtain-wall openings. This will accommodate large flows.

2—Erect curtain wall with trap formed by pipes placed at such an angle that the outlet is higher than the inlet. This is for small flows.

3—Erect curtain wall with sewer pipe lead from the mine to the outside and to box trap. Will handle flow up to capacity of pipe.

4—Erect dam-type seal, or impounding seal, which causes water to flow over the seal or dam at a point higher than the coal top. This can be built with or without a French drain, and usually is used for a limited flow and where the entry to the mine is badly curved.

5—Erect modified dam and riprap seal where the water flows through a stone fill over a low weir wall.

Of these, the first two methods were the most generally used.

In every case where a wet seal was used, weirs were installed for the accurate measurement of the drainage. Tests were made both before and after sealing, and in cases where the drainage, after sealing, did not show a marked decrease in sulphuric-acid content, the ground about the mines was gone over carefully to check for openings that had not been found in the first and subsequent surveys.

Sealing Shows Results

That the sealing of the mines would accomplish its purpose—the virtual elimination of the sulphuric-acid discharge from the abandoned mines—was shown early in the program. J. W. Paul, in a paper prepared for presentation before the Coal Division of the A.I.M.E. in October, 1934, said that sealing 42 mines in Pennsylvania, West Virginia and Ohio had cut the discharge of water from 3,504,000 to 1,421,000 gal. per day and the acid discharge from 72.636 to 20,644 lb. per day—a reduction in acid discharge of 26 tons a day.

C. L. Chapman, West Virginia State Board of Health, reports among other improvements, that Coal River is now alkaline twelve months a year and fishing is good all summer; fish used to leave with low water. Monongah No. 3 drain stocked eighteen months, after having been sealed eighteen months, with black bass and fish still thriving. "Tygart River—Mouth Roaring Creek down, red color gone and red deposit on rocks nearly gone; tannery black, precipitated previously in mile below Roaring Creek, now visible six miles further downstream at Junior; not now enough acid to neutralize."

For the first time in 25 years fish have come down stream three miles below first mine pollution at head of Roaring Creek. Acidity in Beaver and Browns creeks has decreased about 50 per cent. The Clarksburg Water Co., which formerly used Browns Creek water in a natural mixture to start coagulation process, now must construct a coagulation basin and add mineral alum to process.

"Fish were all killed out of Elk Creek above Gnatty Creek some ten miles. Now fish are living in stream clear to Spall Run, or nine miles of formerly bad stream. Farmers near head of stream, source of pollution, had to carry and pump water for stock. Now stock drink water everywhere. Reclaimed about 50 acres of meadows that were affected by mine seeps and were too sour for grass." The Phillippi Water Plant is using little more than half the chemical for acid treatment required two years ago.

Coalton Boiler House on Roaring Creek reports (July, 1936) that with plant running day and night they have not used any soda ash for a year nor have they had to replace any boiler flues for eleven months. This plant is a comparatively small one, yet it spent approximately $300 a month for water treatment prior to the mine-sealing program. Morgantown Water Plant raw water used to run 40 p.p.m. This past summer, during the drought period, the highest recorded was 6 p.p.m. acidity.

The State Health Department of Ohio reported tests on seven streams before and after sealing abandoned mines which drained into them. In each case, the former red color had disappeared and the acidity of the streams was reported reduced by approximately 50 per cent of their aluminum content, and their iron content by approximately 60 per cent.

Checks made in Pennsylvania showed the efficiency of sealing to eliminate acid. The Pioneer No. 7 mine, in Indiana County, was discharging daily more than 3,000,000 gal. of water containing more than 2,300 lb. of acid before sealing. After sealing, the discharge fell to 73,500 gal. a day, containing 80 lb. of acid. Commercial No. 4 mine (Cambria County) discharged 105,000 gal. of water per day containing more than 3,000 lb. of acid before sealing. After sealing, the discharge amounted to 32,000 gal. a day containing less than 200 lb. of acid. Tests conducted at a total of 96 abandoned mines in the State showed that they discharged 13,000,000 gal. of water per day containing 66,000 lb. of acid before sealing, and after sealing the discharge from the same mines was approximately 4,000,000 gal. per day containing approximately 20,000 lb. of acid.

Creviced flats landscaped to exclude air

Overflow dams purify strip-pit effluents

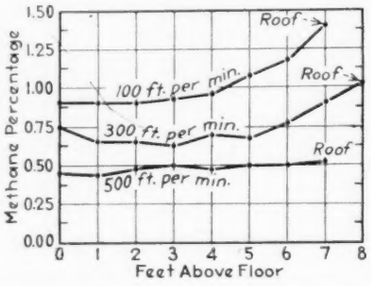
NOTES

From Across the Sea

IN THE world's coal fields, the pounds of methane liberated during mining vary greatly per ton of coal mined. Recently, in *Colliery Guardian*, A. Nelson gave figures for the anthracite collieries of western South Wales ranging from 36.6 to 58.9 lb. (811 to 1,306 cu.ft.) per short ton of coal raised. The figures in the table will be of interest. The first three are those presented by Mr. Nelson in his article, the pounds of methane after multiplication by 22.163 giving the number of cubic feet.

A chart shows the percentage of methane which Mr. Nelson found at various elevations above the mine floor with different ventilating speeds. Why he found greater percentages of methane near the roof than near the floor he leaves to the reader. Was it, he says, due to the ascentional tendency of methane or to the fact that fractures in the roof brought in that gas faster than the current could carry it away? However, he declares that in the roadways in which the tests were made there were no measurable feeders. Only experimentation in a passageway not generating methane will solve this problem.

When pressure falls, air in old standing workings expands and part of it escapes into the roadways carrying its methane, but, says Mr. Nelson, the quantity thus escaping at any time does not depend on the pressure reached but on the change, or trend, of pressure. Should a low pressure extend over a protracted period, the methane delivered to the airways will decrease rather than rise, for, without any further decrease in pressure, there will be nothing to cause methanized air to escape, except the emission of gas from coal face, roof or floor. Similarly, if the pressure is consistently high for a long period and the methane nevertheless shows a gradual increase, the condition may be regarded as ominous, for the current is insufficient to carry off the methane as made, and how will it carry it off when the barometer falls and when methanized air from the goaves begins to expand and fill the workings?



Methane percentages at foot intervals from floor to roof in air currents of velocities shown

Gases are light and respond rapidly to changes of pressure, but mercury is heavy and responds slowly. This explains, according to Mr. Nelson, why in high-barometer periods the methane percentage increases some hours (as many as four) before the barometer shows the decrease in pressure that causes the outflow. Similarly, it explains why, in low-barometer periods, methane percentage decreases some hours before the barometer begins to rise. Atmospheric changes, he adds, after a prolonged period in the old workings are favorable for a time lag of some magnitude. On the other hand, a period of easy undulations following a medium pressure line will produce a medium time precedence in methane changes.

However, in comment it may be denied that time lag is due to the sluggishness of mercury. Occurring most markedly in times of steady high or low pressure, the lag probably is due to the fact that the change in methane content is already assured with pressures as they are, regardless of any pressures that may be about to come. As Mr. Nelson has shown, a rising barometer decreases methane content, but a steady high barometer may permit the percentage to increase. A falling barometer increases methane content, but, with a steady low barometer, the breathing of gas from goaves and gobs ultimately is limited to the hourly product of face, roof and floor methane.

Methane Emitted From Coal per Ton Raised

Pounds	Cubic Feet	Location	Authority
36.6 to 58.9	811 to 1,306	West South Wales Anthracite Region	A. Nelson, Coll. Guardian
36 to 80	792 to 1,781	Doncaster Area, England	R. Clive, Midland Inst. of Mining Engineers
14 to 96	317 to 2,137	Prussian Firedamp Commission	R. W Dron, "The Economics of Coal Mining"
93 to 138	2,066 to 3,053	Pocahontas No. 4 Seam Mine, W. Va.	F. Haas, A.I.M.E., Oct., 1926
0 to 135	0 to 2,988	Ten Palms Bed, Charleroi Basin, Belgium	Coal Age, Jan., 1936, p. 22
4.6 to 20.6	102 to 457	Chaineaux Bed, Liege Basin, Belgium	Coal Age, Jan., 1936, p. 22

FOR the study of mine dust, a good method of collection is necessary. The powdered-sugar tube has been discredited as a means of determining quantity, because it collects both large and small dust. A 10-micron mote will weigh 64,000 times as much as a ¼-micron mote, yet the former is not as dangerous as the latter. In taking the increase in weight of the sugar after the dust is collected, the weight of each relatively harmless 10-micron dust particle appears to add to the peril of the dust as much as 64,000 harmful particles of the ¼-micron dust.

The konimeter sucks a small volume of air at a high average velocity through a jet, and this impinges on a glass plate. Some of the dust is held on the plate, but much of the fine dust fails to adhere. The thermal precipitator operates on the principle that dust is repelled from a hot surface and deposited on a cold surface, as will be noted on a light-colored wall above a hot pipe or radiator. The deposit of dust above the hot surface evidences this phenomenon. With the precipitator, a thin wire electrically heated repels the dust to two glass plates on either side, and the dusty air deposits its fine dust on these glass plates in two sharp lines, so that they can be examined and counted under the microscope.

The committee on dust-sample investigations of the British Institution of Mining and Metallurgy declares equipment for dust collection should collect all the dust, should be portable and enable samples to be taken quickly and be such that any person capable of ordinary instrument work should be able to use it reliably. It should enable the sample to serve for (1) the estimation of the number and size of the dust particles in a unit volume of air, (2) the identification of the mineral constituents of the dust and (3) its chemical analysis. The committee apparently is not interested in the gross weight.

For the committee, tests have been made with anthracene ($C_6H_4.C_2H_2.C_6H_4$) as a filter, but air travels through it too slowly—only 0.71 cu.ft. per minute with a filter of 1.575-in. diameter—and the pressure drop needed is about 4 lb. per square inch. To create this suction, a pump is necessary and, as it should be mechanically operated, is disadvantageous. Moreover, the atmosphere around drilling operations contains an oil mist, which may exceed quantitatively the dust that is to be caught. This oil forms a tarry solution with the anthracene effectively preventing that complete and easy settlement of the filtered material which is an essential feature of the method.

Hence, the latest wrinkle is to use pure, finely crystalline salicylic acid ($C_6H_4(OH)COOH$) on a suitable support, preferably a stainless-steel gauze.

By use of the gauze, the difficulties arising from the use of a filter paper are avoided, because, if the dust is scraped off the paper, the product is contaminated with cellulose fibers, which make for trouble and uncertainty on examining the specimen microscopically in polarized light, and some of the dust may embed itself in the filter paper, so that it cannot be scraped away. If the filter paper is burned, its ash adds to the difficulty, even when the paper is low in ash, and the heat of combustion may affect the sample, eliminating combined water and volatile acid radicles, as, for example, in the carbonates and sulphates, or changing the state of oxidation, notably from ferrous to ferric iron. Paper also clogs rapidly, so that, to get a fair-sized sample for analysis, several filters will be necessary.

Practically insoluble in cold water, salicylic acid is very soluble in alcohol, and the solution when centrifuged soon separates itself from the finest dust when a centrifugal force 3,000 to 5,000 times that of gravity is employed. For analysis giving total and combined water, ignition loss, silica, iron, alumina and perhaps potash, 5 mg. (0.00035 oz.) is required. For duplicate analysis and to determine alkalies and calcium, magnesium and phosphate, 20 to 50 mg. is required, and more may be necessary if the chemist is not aided by prior information furnished by a petrologist, who for his examination must have a half milligram of dust. The latter can identify the nature of the dust if of 5-micron size, and even of 3-micron, if he knows the nature of the rock from which the dust is derived. For microscopic determination, the sample should not be heated above 122 deg. F.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

A.S.T.M. Standards on Coal and Coke, Committee D-5 on Coal and Coke. American Society for Testing Materials, Philadelphia, Pa. 143 pp., 6x9 in. Price, single copies, $1.25.

This publication is a reprint from the copyrighted society memoirs and contains all the standards as revised up to September, 1936. It seems a pity that such portions of this publication as are revisions are not italicized for the more easy and rapid perusal of those parts which are new; however, the dates of revision give some indication of the sections which have been revised. Shatter and tumble tests are new and the specifications published are merely proposed drafts, which are published for information only. A tentative method for designating the size of coal from its screen analysis received limited approval in 1936. It designates round-hole screens as having 8-, 6-, 5-, 3-, 2½-, 2-, 1½-, 1¼-, 1-, ¾-, ½-, and ⅜-in.-diameter openings and sieves of wire cloth with No. 4 (4,760-micron), No. 8 (2,380-micron), No. 16 (1,190-micron), No. 30 (590-micron), No. 50 (297-micron), No. 100 (149-micron) and No. 200 (74-micron) openings. Designations indicate the range of size by giving the lower and upper limiting screens between which more than 80 per cent of the sample is retained by actual test.

A proposed draft is given for the agglutinating value of coal. It embodies the carbonized sand-coal button method. The values are determined for 15:1, 20:1, 25:1 and 30:1 mixtures of sand and coal; the strength of which is to be stated in kilograms. Both the tentative specifications for classification of coal by rank and the standard specifications for round-hole screens for testing purposes have been revised. This publication should have wide distribution among operators, preparation men, salesmen and chemists.

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Accident-Cost Data on Most of the Bituminous Coal Mined East of the Mississippi River From April 1, 1934, to Jan. 31, 1935, by J. J. Forbes and C. W. Owings. I. C. 6896. 17 pp., 8x10½ in.; mimeograph; paper.

In Table II of this monograph, it is shown that at 992 mines producing 177,743,049 tons between April 1, 1934, and Jan. 31, 1935, the margin of profit was $0.0262 per ton and the compensation insurance was $0.0490. The operating loss per ton of coal in the mines studied in Alabama, Kentucky, Maryland, Michigan, Pennsylvania bituminous, Tennessee, Georgia and Virginia averaged 4.46c., whereas the average compensation cost was 5.42c. per ton. If the actual cost of accidents had been reduced a cent per ton, coal could have been produced in all States without loss. The cost of compensation insurance was nearly a cent a ton higher in the States where coal was produced at a loss than in the States where it was produced at a profit. The severity of injuries in the mining industry is nearly six times as high as in industry in general.

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The Union Pacific Coal Co. Code of Standards. Union Pacific Coal Co., Omaha, Neb. 177 pp. 5¼x8 in.; loose-leaf leather binder. Price, $3.

This volume is the sixth revision of the original code of standards first issued July 15, 1925. It covers all kinds of standards: electricity, boilers, pulverized fuel, automobiles, major disasters (on red sheets), rescue apparatus and training, rock-dusting, general safety, safety lamps, explosives, ventilation, idle machinery, timbering, surface fires, car retarders, concrete, pumps, scrapers, shaking conveyors, wire rope, inclined planes, draft gear, mining machines, track, weighing, employment, reports of injuries and first aid. Information follows as to electricity, bonding, gradients, fan charts; Rock Springs, Hanna and Superior measures. It contains, as it states, standards rather than job analysis and is definitely keyed, of course, to the needs and conditions at the company's mines.

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Behavior of Flame Safety Lamps in Mine Atmospheres Deficient in Oxygen, by A. B. Hooker, E. J. Coggeshall and G. W. Jones, U. S. Bureau of Mines. R. I. 3327, 6 pp.; mimeograph.

According to the authors' studies, when a flame safety lamp is brought into a depleted atmosphere (one deficient in oxygen) the flame lengthens—a phenomenon sometimes described as the flame's "search for oxygen." Then it changes color and, if no methane is present, shortens to less than its original length. In the presence of methane the flame may be equal to or higher or lower than in fresh air, depending on the relative quantities of methane and oxygen present. With oxygen deficiencies ordinarily found in mines, flame heights always are above the original setting if methane is present and always below if oxygen is deficient and methane is absent.

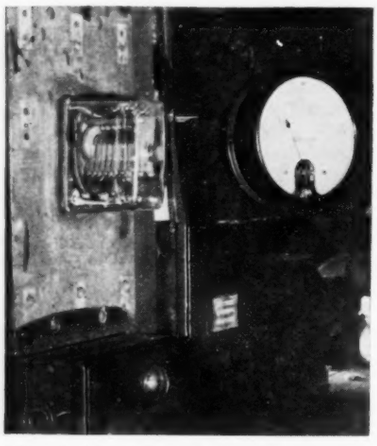
With the improved lamp having a bimetal coil above the wick, the bimetal device responds to the initial increase in flame length and gives a scale indication, in inches of deflection, proportional to the height of the flame, irrespective of its color. A sustained increase in flame height with dimming of the flame shows both presence of methane and deficiency of oxygen. The first evidence of oxygen deficiency is an initial increase in flame height, which will be followed by a decrease if methane is not present. Regardless of percentage of methane, the flame will be extinguished when the oxygen content, which in fresh air is 20.9, falls below 13 per cent.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Sequence Starting Attained By Use of Motor Relay

Adaptation of a motor-driven timing relay built for reversing laundry machinery proved a simple and effective method of changing the tipple and preparation-plant controls from selective-manual to automatic-sequence at the Boone County Coal Corporation, Sharples, W. Va. Operators had been



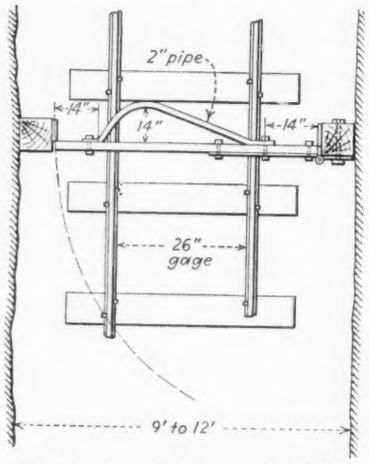
The timing relay is the glass-covered unit mounted on the panel to the left of the plant ammeter

instructed to start the motors in a certain sequence and with proper time delays to prevent choking equipment and to reduce power demand, but, as usual, the human element was responsible for wide variations in the procedure.

Because of its light-duty design for operation of intermediate relays, the timing relay, a Westinghouse Type SW unit, was not recommended by the manufacturer for this coal-plant service, but during a year of service it has operated satisfactorily. At the mine shop the contacts were rearranged from the original to accommodate the sequence starting of seven groups of motors. A stop button with lockout clip is located near each motor, thus affording means of separately operating individual motors for repairs or inspection. At the central control point one pushbutton starts the relay, which in turn starts the entire tipple in proper sequence. Another button shuts down all motors of the plant.

Bumpers on Mine Doors Speed Haulage

With a haul of practically four miles from the face to the tipple, followed by an incline 6,000 ft. long down to the washing and screening plant, transportation is the biggest problem encountered at the mine of the Whitwell Smokeless Fuel Corporation, Whitwell, Tenn., writes A. W. Evans, chief mine inspector, in describing



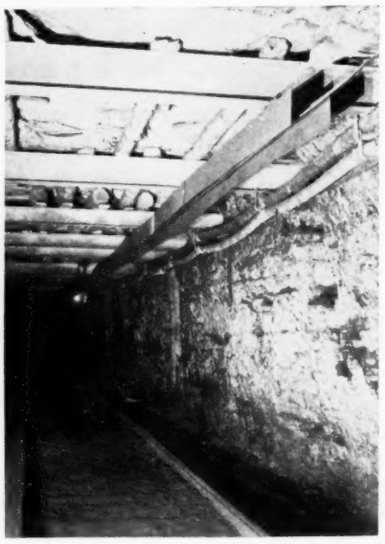
Showing how the bumper is applied to a door at Whitwell mine

bumpers used on the doors underground. To facilitate transportation and keep movement as uniform as possible, a miner conceived the idea of equipping the doors with bumpers made of 2-in. pipe bent to the proper shape (see illustration).

When a trip is going in, the motorman stops and opens the door. He then gets back on the locomotive and pulls ahead. The door is prevented from swinging back to position by the bumper, which rests against the sides of the cars as they pass. When the trip is through, the door closes of its own accord. Coming out, the process is exactly the same.

Hard-Pressed Board Guards New Orient Trolleys

About a year ago hard-pressed board superseded split hose as a trolley-wire guard material at the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill. This material is purchased in 4x8-ft. sheets which are sawed into strips 6 in. wide by 8 ft. long. Use of these strips to guard against the wire along a section of main haul is shown in the halftone.



Ample protection against contact with the trolley wire is provided by ⅛ in. of pressed board

At present "standard hard board" of ⅛-in. thickness is being used. The boards are attached to the hanger brackets by wire, but, due to the fact that these wires are in some cases damaged by arcs when a wheel leaves the trolley, it has been proposed that marline be tried as a means of suspending the boards. The tie would consist of a loop around the hanger and extending through a hole drilled near the top edge of the board.

Hints From a Shopman's Notebook; Torch Holder for Lathe

By WALTER BAUM

Master Mechanic, Perry Coal Co.
O'Fallon, Ill.

IN CUTTING rails in the manufacture of frogs and switches (see February *Coal Age*, p. 90), the lathe offers the best means of propelling the torch, as the desired speeds are provided by the screw-cutting gears and cone pulleys and the smoothness of the carriage movement permits cuts that are just about perfect if the torch tip is clean. An attachment to permit the use of a lathe in holding and guiding the torch is described below.

Fig. 1 is a general view of the torch holder in position. It is attached to the lathe by two steel straps, two bolts and a piece of steel the same height as the box or flat end of the holder arm, using the T-slots in the lathe carriage. The holder can be turned over to lower the torch, and the offset bracket permits turning the handwheel to adjust the position of the torch. Figs. 2 and 3 show the adjustable head on the holder. Travel adjustment is 2 in., or longer if desired, and the torch can be turned to any angle.

The arm carrying the adjustable head is made of a piece of 1¼-in.-diameter pipe with either a box or flat end, as shown in Fig. 8. If a box end is used, it can be fabricated by welding two angles together at the corners and then welding the box to the pipe. The bracket on the opposite end of the arm is made of ⅝x2-in. mild steel welded as indicated. On this bracket is welded a collar (Fig. 8) which receives the shank of the adjusting clamp described below. To hold the adjusting clamp solid after it is adjusted with the handwheel and also to permit the torch to be turned

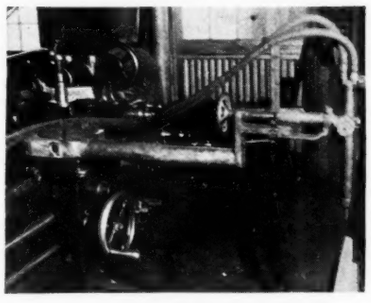


Fig. 1—General view of torch holder in place on lathe

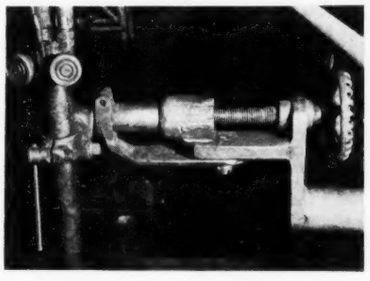


Fig. 2—Adjustable head used for holding torch in desired position

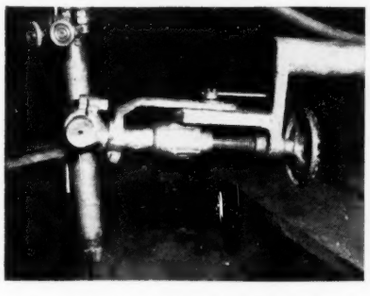


Fig. 3—Showing clamping arrangement to hold torch in place after adjustment is made with the hand wheel

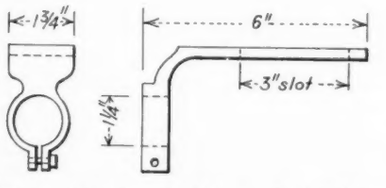


Fig. 4—Details of locking and clamping strap

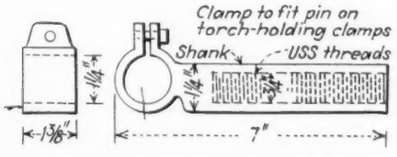


Fig. 5—Details of adjusting clamp

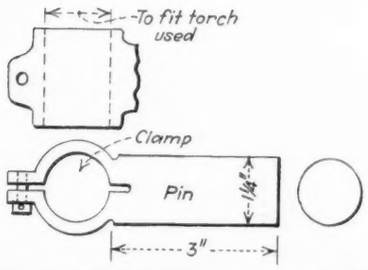


Fig. 6—Torch-holding clamp and pin

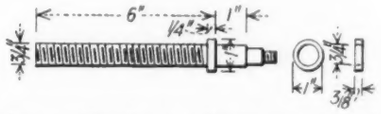


Fig. 7—Details of adjusting screw and collar

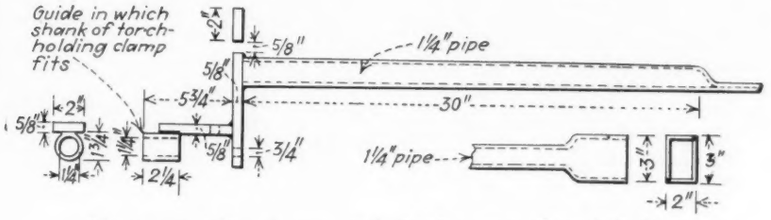


Fig. 8—Details of arm and bracket parts of torch holder

Always With Us

● There never comes a time when new problems or old problems in a new form are lacking around a coal mine. This means that operating, electrical, mechanical and safety men need both training in meeting the unexpected and a reservoir of knowledge from which they can extract without delay a direct solution to the immediate problem or one which can quickly be adapted to the situation. These pages furnish selected items for the filing cabinet, whether it be in the head or in the office, and also are open for your contribution. Writing skill is not necessary, as it is the idea that counts. Send yours in. Coal Age will pay $5 or more each for those that are acceptable.

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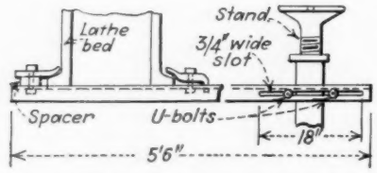


Fig. 9—Showing how stand is held to lathe by angle

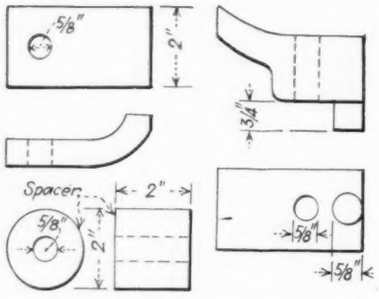


Fig. 10—Left, clamp and spacer for back of lathe; right, clamp for front of lathe

from one side to the other to regulate the drag, the auxiliary locking and clamping strap detailed in Fig. 4 and shown in Figs. 2 and 3 is employed.

Fig. 5 gives the details of the adjusting clamp with 1¼-in.-diameter shank tapped with ¾-in.-diameter USS threads to match the threads on the adjusting screw. The clamp is designed to accommodate the pin on the torch-holding clamp detailed in Fig. 6, and permits the torch to be turned at an angle for making bevel cuts. The torch-holding clamp should be made the correct size to accommodate the torch used. Fig. 7 gives the details of the adjusting screw mentioned above and also shows the collar employed with it (see also Figs. 2 and 3). The back end of the screw is squared to fit the handwheel used.

Holding the rails while they are cut is a relatively simple task, using one of the stands described in the May, 1936, *Coal Age*, p. 210. The stand is held to the lathe by a ⅜x2½x2½-in. angle as shown in Fig. 9. A U-bolt passing through the slot is used to clamp the stand to the angle, which is held to the lathe bed by the two clamps shown in Fig. 10. A spacer of the proper height is used on the clamp for the back of the lathe. The clamp for the front of the lathe is cut out of mild steel with a torch and is made with a lug ⅝ in. in diameter and ¾ in. long on the back end. This lug fits in a hole in the angle when the bolt is drawn up and automatically establishes the position of the angle as the bolt is tightened.

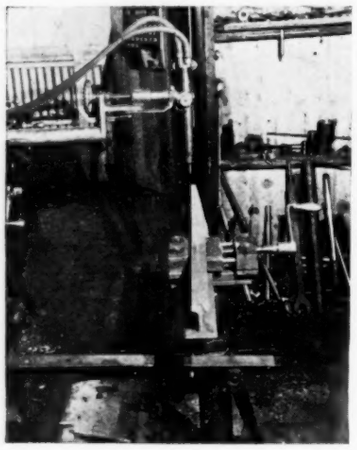


Fig. 11—Rail holder with switch point trimmed on straight side. This view also shows the stand and how it is clamped to the angle which holds it to the lathe bed

Fig. 12—Details of base for rail holder

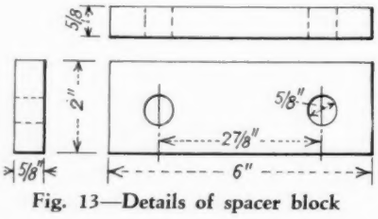


Fig. 13—Details of spacer block

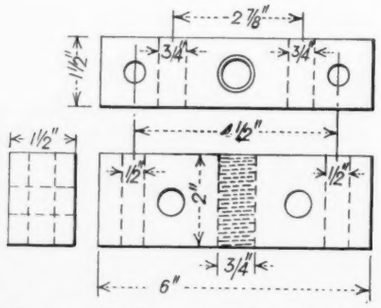


Fig. 14—Details of screw block used in rail holder

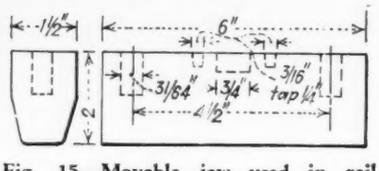


Fig. 15—Movable jaw used in rail holder

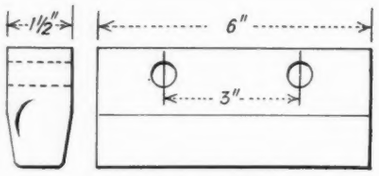


Fig. 16—Details of rigid jaw

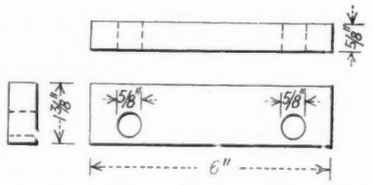


Fig. 17—Details of spacer used under rigid jaw

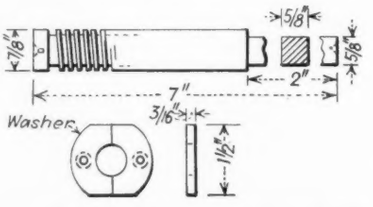


Fig. 18—Details of clamping screw and split washer used in rail holder

The rail holder employed is shown in Fig. 11. The plate used for the base of the rail holder is detailed in Fig. 12. The ½-in. holes in the center are drilled by placing this plate on the stand and drilling through both the plate and top of the stand, countersinking the holes. The four ⅝-in. holes are located after the screw block and the two clamping jaws have been made. The spacer block used under the screw block (Fig. 11) is shown in Fig. 13. The ⅝-in. holes match those in the screw block, detailed in Fig. 14.

The screw block is made of 1½x2-in. mild steel. The large hole in the center was drilled ¾ in. and tapped with ⅞-in. USS threads. When this hole was drilled, the block and the movable jaw described below were clamped together and the hole was drilled through the block and part way into the jaw. The ½-in. holes in the screw block accommodate guide pins and the ⅝-in. holes permit bolting block and spacer to the baseplate of the holder.

Details of the movable jaw are given in Fig. 15. It is made of 1½x2-in. mild steel and the side against the rail is shaped to fit when the rail is turned either ball or base up. Guide pins ½ in. in diameter were pressed into the two ⅝-in. holes in the back of the movable jaw. These pins work in the ½-in. holes in the screw block. In addition, the back of the jaw was drilled with

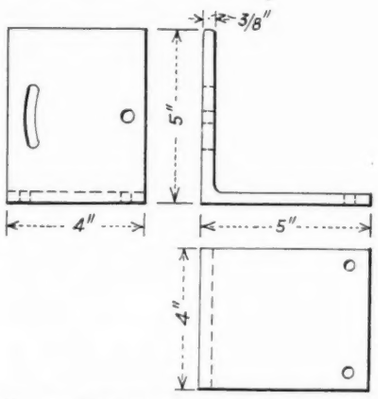


Fig. 19—Details of the angle for holding rail holder in a vertical position.

two $\frac{3}{16}$-in. holes tapped out to $\frac{1}{4}$ in. to hold the split washer used to hold the clamping screw in the jaw. The rigid jaw used on the back side of the rail is shown in Fig. 16. It is drilled with two holes to match the holes in the spacer block (Fig. 17) used underneath it. Clamping-screw details are given in Fig. 18, along with the details of the split washer used to hold it to the movable jaw. The screw is made of $\frac{3}{8}$-in.-diameter heat-treated steel, with one end squared to $\frac{5}{8}$ in. and 5 in. of USS threads cut on the other.

As has been noted, the stand top is drilled to match the base of the holder, which is held to the stand by bolts with countersunk heads through the $\frac{1}{2}$-in. holes. The holder can be raised or lowered by the screw incorporated in the stand, and with a rail clamped in the holder and the U-bolt loosened the stand can be moved in or out to bring the rail in line with the torch. The stand is turned in either direction to place the line of cut directly under the tip (both stand and lathe must be placed on a floor of the same level). All cuts that are alike are made before changing to make another cut.

To make the bevel cut on the bottom of the rail in making a switch (Fig. 2, p. 90, February *Coal Age*), the rail holder is removed from the stand and replaced in a vertical position, using the angle detailed in Fig. 19 and shown in use in Fig. 20. This piece of angle ($\frac{3}{8}$x4x5 in.) is 4 in. long and is drilled with two $\frac{1}{2}$-in. holes to match the holes in the top of the stand. The holes in the opposite leg of the angle are drilled to match the baseplate of the rail holder. One of these holes was cut out as shown in Fig. 19 to permit raising or lowering the holder to position the rail at an angle for making the bevel cut on the bottom of the rail—which has the same angle as the top of the rail base.

A stop should be made so that the rails can be held the same way each time. The end with the fishplate holes is placed against the stop, which can be made out of two pieces of $\frac{3}{8}$x2-in. plate with $\frac{5}{8}$-in. holes in one end to permit bolting the stop to the screw block and the rigid jaw of the rail holder. The opposite ends of the two pieces can be slotted so that a piece of angle can be bolted to them and at the same time can be moved in and out as desired.

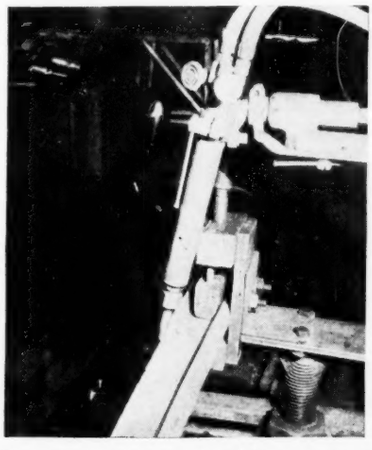


Fig. 20—Showing rail holder turned up vertically for making bevel cut on base of rail.

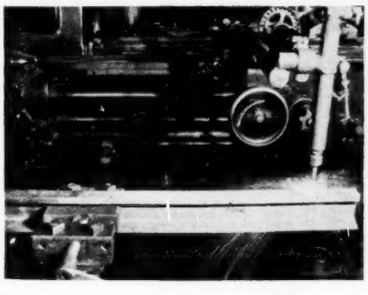


Fig. 21—Torch in action making a cut on the top of the rail.

Dewatering-Screen Air Jets In Use at Amherstdale

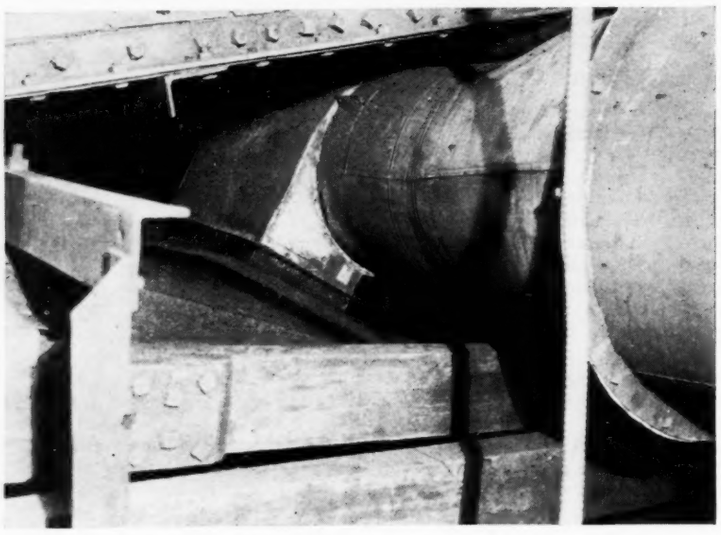
That jets of air at high velocity impinging on $\frac{1}{4}$x1$\frac{1}{4}$-in. wet coal as it passes over a high-speed combination dewatering and classifying screen can effect an additional reduction of 2$\frac{1}{2}$ per cent in moisture is the conclusion from experiments conducted at No. 1 preparation plant of the Amherst Coal Co., Logan County, West Virginia. Although still considered as experimental, the air jet dryer is in regular use. The first model was installed in the autumn of 1935 and a second design supplying more air was substituted in September, 1936.

The air issues from nozzles the openings of which are narrow slots of lengths equaling the screen width. The nozzle opening is adjustable in the range from $\frac{1}{8}$ to $\frac{1}{4}$ in. and at present an opening of $\frac{3}{16}$ in. is being used. Eight nozzles direct that number of "curtains" of air against the coal at a velocity between 10,000 and 12,000 ft. per minute. This air at a pressure of 6 in. water gage is supplied by a Robinson 28x15-in. Type H backward-curve blade fan direct driven by a 40-hp. motor taking an input of 26 hp.

A short duct connecting the blower to the nozzle box completes the equipment and the total cost for a similar installation should not exceed $1,000. The dewatering screen onto which the air jets impinge operates at 266 r.p.m. and its deck is wedge wire with 2$\frac{1}{2}$-mm. openings. The coal product washed at the plant is $\frac{1}{4}$x2$\frac{1}{2}$ in., but the air jets are used only in drying the $\frac{1}{4}$x1$\frac{1}{4}$-in. fraction.

Experiments began with only two nozzles and a water gage of 2 in., which imparted a nozzle velocity of 4,000 ft. per minute. Results of this first installation indicated that the method had possibilities; therefore the experiments were continued. A. S. J. Hopkins, manager of mines, who developed the

The blower, which consumes 26 hp., is installed within 3 ft. of the dewatering screen



View of the air duct and its connection to the top of the nozzle box

dryer, states that the 2½ per cent reduction was determined by taking samples at the end of the screen with the air jets working and then with the air cut off and weighing these samples before and after drying in an armature baking oven.

He has observed that this air-jet dryer is more effective during cool weather, when the air temperature, being lower than that of the coal, causes considerable evaporation to take place. He surmises that in warm weather some moisture from the air condenses on the coal, but, due to the natural tendency for the product to dry faster at that season, the two effects practically balance each other by the time the coal is shipped.

For use in determining air velocities during the experiments a Boyle direct-indicating Velometer was used. Mr. Hopkins also has utilized this instrument to advantage in checking mine ventilation.

Auto Truck Parts Make Prospecting Drill

A cost of approximately $300 and ability to drill up to 55 or 60 ft. of overburden are features of a prospecting drill used by the Blue Bird Coal Co., operating stripping properties near Carrier Mills, Ill. The drill was developed by James H. Fletcher, consulting engineer, of Chicago, and employs the engine, drive shaft and rear-axle assembly from a junk Model A Ford truck. Overburden augers similar to those used on the regular overburden drills at Blue Bird are employed, together with molefoot bits.

In addition to the truck parts, the drill consists of a chassis fabricated of angles and plates. Vertical guides for the boring bar are mounted over the rear axle and are held in position by pipe braces, as shown in the accompanying illustration. A small platform at the top of the guides supports a small winch for handling the boring bar and augers, and also serves as a mounting for the gear and pinion which drive the boring bar. The drilling unit is carried on steel farm-implement wheels and is arranged so that it can be pulled from place to place by a team of horses or mules. The unit was fabricated for the most part by welding.

In mounting the truck engine, drive shaft and rear-axle assembly in the chassis, one end of the latter was cut off and the other end was turned up vertically (see illustration). To secure the necessary height for the driving gear, the truck axle was lengthened by adding an auxiliary shaft carrying on its upper end the driving gear in question. The boring bar is supported in a sleeve in turn mounted in a crosshead running between the vertical guides. A wire rope running from the crosshead to the winch permits the boring bar and augers to be raised or lowered, as desired. A hand crank and sprocket on the side of the chassis is provided for operating the winch. Connection between the winch sprocket and the crank sprocket is made by a bicycle chain.

Augers are made in 7-ft. lengths. As a result of experience, the pitch of the auger spirals has been reduced from 3½ in. to 2 in., as it has been found that the reduced pitch facilitates bringing the cuttings to the top of the hole. Under certain conditions, however, the heavier pitch has an advantage in that drilling speed is increased slightly. Normally, however, the reduced pitch is employed, as there is much less difficulty with clogging or binding of the spirals. While designed primarily for use in earth, shale or other relatively soft materials, the augers also will cut harder material, although at a reduced rate. In shale, the drill has a cutting rate of approximately 2 ft. per minute.

In using the drill herein described, it normally is the custom to employ it to put down holes to just above the seam. Then hand tools are employed to cut the rest of the way down to and through the seam, as with hand tools there normally is less chance of error in determining the nature and thickness of the material being penetrated.

Using junk truck parts kept down the cost of this Blue Bird prospecting drill

WORD FROM THE FIELD

Smokeless Operators Form Selling Agency

Southern West Virginia smokeless operators representing an annual output of more than 25,000,000 tons formed a marketing agency in New York on March 18. This action was the culmination of meetings extending over several months. The group had worked out plans for the agency two years ago, when legislation deferred further action. Organizers of the new agency, which will be patterned largely after Appalachian Coals, Inc., expect to sign up additional tonnage soon. The new organization will be known as the Smokeless Coal Corporation.

Temporary headquarters are at 1 Broadway, New York, and the following officers have been chosen: president, William G. Caperton, president, Slab Fork Coal Co.; vice-president, H. B. Baird, vice-president, Koppers Coal Co.; secretary-treasurer, H. R. Hawthorne, vice-president, Pocahontas Fuel Co.; managing committee, O. L. Alexander, president, Pocahontas Fuel Co.; R. H. Knode, president, Stonega Coke & Coal Co.; W. G. Crichton, secretary, Greenbrier Smokeless Coal Association; S. S. Nicholls, White Oak Coal Co.; and Mr. Baird.

New Preparation Facilities

CONTINENTAL COAL CO., Cassville, W. Va.: contract closed with Jeffrey Mfg. Co. for washing-plant addition to existing tipple; equipment will include one three-compartment Jeffrey-Baum jig, dewatering and clarifying screens, conveyors and complete water-circulation and clarifying system using Jeffrey type settling tank; capacity, 275 tons per hour.

PITTSBURGH COAL CO., Negley (Ohio) preparation plant: contract awarded Roberts & Schaefer Co. for Stump Air-Flow cleaning plant; capacity, 100 tons of ⅜-in. x 0 slack per hour.

RED JACKET COAL CORPORATION, Keen Mountain mine, Buchanan County, Virginia: contract closed with Jeffrey Mfg. Co. for five-track tipple equipped with shaking distribution chutes for mine-run; primary and secondary shaker screens, Jeffrey-Traylor vibrating screens for stoker-coal separation, apron-type picking tables on shuttling frames with power drive, scraper-type loading booms, Jeffrey single-roll crushers for lump and middlings; all picking tables will discharge over vibrating rescreens and a mixing conveyor will be furnished to provide flexibility in loading combinations; capacity, 400 tons per hour.

SUPERIOR COAL CO., Gillespie, Ill.: contract closed with Jeffrey Mfg. Co. for complete steel-frame tipple to load two sizes of coal for railroad fuel; equipment to include primary and secondary shaker screens, four lines of apron picking tables, high-speed loading boom with diversion chute for use while changing railroad cars, and complete system of conveyors for handling coal and refuse; capacity, 600 tons per hour.

Keeping Step With Coal Demand

Bituminous Production

	1937 (1,000 Tons)	1936* (1,000 Tons)
Feb. 6	9,805	10,179
Feb. 13	10,070	10,458
Feb. 20	10,744	9,862
Feb. 27	11,081	9,923
Mar. 6	11,030	8,890
Mar. 13	11,200	7,684
Total to Mar. 13	104,910	97,078
Month of January	**40,940**	**39,330**
Month of February	**41,740**	**41,154**

Anthracite Production

Feb. 6	972	1,692
Feb. 13	981	1,621
Feb. 20	769	1,613
Feb. 27	646	1,805
Mar. 6	652	943
Mar. 13	1,010	792
Total to Mar. 13	9,315	14,043
Month of January	**4,025**	**5,333**
Month of February	**3,368**	**6,975**

*Outputs of these two columns are for the weeks corresponding to those in 1937, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) Feb. 1 1937	Jan. 1 1937	Feb. 1 1936
Electric power utilities	7,415	7,162	5,983
Byproduct ovens	8,031	8,535	4,640
Steel and rolling mills	1,368	1,264	901
Railroads (Class 1)	7,332	6,847	5,193
Other industrials*	11,031	11,218	9,035
Total	35,177	35,026	25,752

Bituminous Coal Consumption

	(Thousands of Net Tons) Feb. 1 1937	Jan. 1 1937	Feb. 1 1936
Electric power utilities	3,477	3,759	3,265
Byproduct ovens	6,262	6,242	4,765
Steel and rolling mills	1,231	1,283	1,166
Railroads (Class 1)	8,121	8,229	7,918
Other industrials*	12,187	12,482	10,684
Total	31,278	31,995	27,798

*Includes beehive ovens, coal-gas retorts and cement mills.

Cincinnati Equipment Display To Break All Records

Space already booked for the 14th annual convention of Practical Coal Operating Men and National Exposition of Coal-Mining Equipment, to be held at Cincinnati, Ohio, the week of May 17, will make the exhibit features of the convention the largest in its history. Up to the middle of March well over 100 manufacturers had contracted for space and additional demands were pouring in on Washington headquarters of the American Mining Congress, which sponsors the convention. Arrangements have been made to supplement the 75,000 sq.ft. of floor space normally available at the Music Hall, where the meetings were held, with the erection of a large annex in front of the building.

Equipment on display will range from large loading and cutting machines and mine cars down to smaller supply items. A number of elaborate operating models also will be shown. Transportation equipment will be exhibited by at least 33 companies; electrical equipment, 20; loaders, conveyors and scrapers, 18; preparation, 14; hoists and dumps, 11; bearings, 9; wire rope, 9; safety equipment, 8; lubricants and lubricators, 7; explosives and blasting equipment, 7; pumps and piping, 6; cutting and shearing machines, 5; mechanical-power-transmission apparatus, 4; welding, 3; ventilating, 3; drilling machines, 2; wood treating, 2 companies.

To Present a Variety of Topics

Over forty papers on practical operating and allied problems have been scheduled for presentation at the technical sessions of the convention. In reviewing the field of mechanical loading, it is planned to present general descriptions of outstanding mechanized operations, followed by papers on problems of underground face preparation, shearing, cleaning impurities, reducing degradation, and surface cleaning. Another series of papers will treat the operation of single and multiple conveyor units with hand loading, mechanical loading of conveyors and conveyor handling from face to tipple.

Discussion of preparation will include a symposium on mechanical cleaning and processing, a survey of drying methods, dewatering screens, dedusting, and preparation practices and problems in the anthracite region. In considering the power question, papers will be offerred on the operation of mine power plants, mercury-arc rectifiers, and the relation between power factor, load

factor and load demand. Transportation aspects to be emphasized will be truck haulage in strip mining and the substitution of rubber-tired equipment for tracks in underground haulage.

The application of streamline research to mine ventilation also will have a place on the program. Safety will be treated from the standpoints of mine-rescue training, safety bonuses, educational methods and the effect of accidents on production and costs. Discussion of research and scientific tests now under way to determine roof movement over areas being mined also is scheduled and major coal-research problems will be approached from the angle of research to promote more efficient utilization of coal and efforts to increase coal production.

Technical sessions will be held twice daily May 17 to May 20. The exposition of equipment, however, will be open until 1 p.m. May 21 in order to give all operating men ample opportunity to inspect the equipment exhibits.

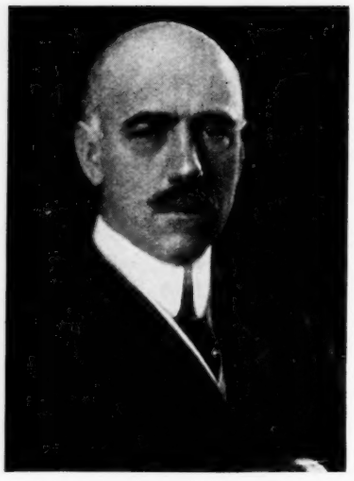
Miners' License Bill Dies

The bill to license coal miners in West Virginia, which had the backing of William Blizzard, vice-president of District 17, United Mine Workers, died in the State Senate at Charleston on March 13. Supporters of the measure failed to obtain the four-fifths majority necessary to suspend constitutional rules and bring up the bill for passage. The Mining Committee of the House had made a favorable recommendation (*Coal Age*, February, p. 128) and the House passed its draft of the measure, 68-17.

Plan Illinois Coal Course

More than five hundred coal men are expected to attend the annual short course in coal utilization sponsored by the University of Illinois, to be held at Champaign-Urbana May 25-27. The Illinois Coal Merchants' Association will hold its meeting in conjunction with the course. Held under the auspices of the department of mining and metallurgical engineering, headed by Prof. A. C. Callen, the course will include discussion of new developments in home and industrial heating plants, stokers, advertising, handling complaints, new methods of coal preparation and treatment, tests, and chemical problems.

The tentative program includes the following: "Chemical Aspects of Coal Utilization," Dr. F. R. Reed, Illinois State Geological Survey; "Recent Developments in and the Trend of Bituminous-Coal Preparation," Ivan A. Given, associate editor, *Coal Age;* "Portable Instruments for Test Purposes, Their Use and Limitations," R. G. Johansen, general manager, Hays Institute; "Selling Steam Coal From an Engineering Viewpoint," A. C. Smith, fuel engineer, Consolidated Coal Co.; "Advantages and Limitations of the Spreader-Type Stoker," T. A. Marsh, central division engineer, Iron Fireman Mfg. Co.; "Domestic Heating Plants," P. E. Mohn, assistant professor of mechanical engineering, University of Illinois; "The Heating Equipment Problem," F. W. Earnest, Jr., president, Anthracite Industries, Inc.; "Some Sensible Stoker Sales Arguments," J. B. Martin, manager, stoker division, Link-Belt Co.; "Installation and Servicing of the Small Stoker," J. R. McClintock, sales manager, stoker division, Illinois Iron & Bolt Co.; "Automatic Controls for Domestic Furnaces and Air-Conditioning Appliances," E. K. Scoggin, Minneapolis-Honeywell Regulator Co.; "Making the Most of Our Market Opportunities," A. J. Chouinard, Sahara Coal Co.; "Advertising by the Retail Dealer for Coal and Stokers," H. N. Baum, Fairbanks, Morse & Co.; "Domestic Hot-Water Supply the Year Round," J. H. Murphy, vice-president, Taco Heaters, Inc.; "New Design Eliminates the Smoke Nuisance for Hand-Fired Stoves or Furnaces," J. R. Fellow, associate in mechanical engineering, University of Illinois.



S. D. Warriner

P. & R. to Reorganize

The Philadelphia & Reading Coal & Iron Co., one of the largest producers in the Pennsylvania anthracite fields, petitioned the U. S. District Court at Philadelphia, Pa., on Feb. 26 for permission to reorganize under Sec. 77b of the Bankruptcy Act. The petition cited illegal mining, reduction in the use of anthracite products, competition from other fuels and State and federal taxes as the causes of its difficulties. Listing losses of $16,214,620 in the last five years, Ralph E. Taggart, president, said that bootleg miners had stolen hundreds of thousands of tons of coal annually from the company.

Judge Dickinson approved the petition as being filed in good faith and signed a decree allowing the management to remain in control until he determined whether to give it permanent control or appoint trustees. The court also directed the company to file a reorganization plan within 90 days.

J. H. Nuelle Heads L.C.N.

Joseph H. Nuelle, president of the New York, Ontario & Western Ry., with which he had been connected since 1908, was elected president of the Lehigh Coal & Navigation Co. on March 25 at Philadelphia. He succeeds S. D. Warriner, who will be chairman of the board of managers. The new president was elected following the acquisition of 250,000 shares of the company's 1,930,065 shares of stock by a banking group headed by the Bancamerica-Blair Corporation.

Mr. Nuelle, who also has been elected to the board of managers, of L.C.N. to succeed the late E. J. Fox, is a native of Chicago and a graduate of Princeton University. After a year with the Pennsylvania R.R. he joined the N. Y. O. & W. as a rodman, becoming, successively, assistant engineer, engineer of maintenance of way, chief engineer, assistant general superintendent, federal manager (1918), general manager, vice-president, and president (1930).

ACI Reelects Officers

Stockholders of Appalachian Coals, Inc., held their annual meeting Feb. 26 at Cincinnati, Ohio, and elected a new board of directors. The board members are: James Bonnyman, president, Blue Diamond Coal Co.; J. E. Butler, general manager, Stearns Coal & Lumber Co.; John C. Cosgrove, president, West Virginia Coal & Coke Corporation; W. J. Cunningham, president, Crummies Creek Coal Co.; L. A. Davison, president, New Jellico Coal Co.; C. C. Dickinson, president, Dickinson Fuel Co.; Arthur Downing, general manager, Monitor Coal & Coke Co.; H. N. Eavenson, president, Clover Splint Coal Co.; J. D. Francis, president, Island Creek Coal Co.; V. N. Hacker, president, Pruden Coal & Coke Co.; Calvin Holmes, president, Holmes-Darst Coal Corporation; John A. Howe, executive vice-president, Truax-Traer Coal Co.; R. E. Howe, vice-president, A.C.I.; S. B. Johnson, president, Lorado Coal Mining Co.; H. E. Jones, president, Amherst Coal Co.; R. H. Knode, president, Stonega Coke & Coal Co.; A. F. Leckie, president, Leckie Coal Co.; E. C. Mahan, president, Southern Coal & Coke Co.; C. R. Moriarty, president, Cabin Creek Consolidated Sales Co.; L. H. Randall, president, Randall Fuel Co.; W. M. Ritter, chairman of board, Red Jacket Coal Corporation; J. Noble Snider, vice-president, Consolidation Coal Co.; C. W. Watson, president, Elk Horn

Coal Corporation; L. E. Woods, president, Crystal Block Coal Co.; J. P. Williams, Jr., president, Koppers Coal Co.

Reports were read from the directors, vice-president and the marketing division, after which officers were reelected and committees renamed, as follows: vice-president and treasurer, R. E. Howe; assistant secretary, T. A. Day; management committee, John A. Howe (chairman), W. J. Cunningham, L. E. Woods; budget committee, L. E. Woods (chairman), W. J. Cunningham, H. E. Jones, E. C. Mahan and C. R. Moriarty.

Wholesale Sales Increase

Wholesale sales of coal and coke approximated $415,000,000 last year, as compared with $369,000,000 in 1935 and $677,000,000 in 1929, according to estimates of the U. S. Bureau of Foreign and Domestic Commerce. In 1933, sales were estimated at $317,000,000—the low point in the eight-year period.

Southeast A.I.M.E Elects

The Southeast Section of the American Institute of Mining and Metallurgical Engineers at its annual meeting in Birmingham, Ala., on March 15, elected new officers and heard addresses by J. B. Morrow, preparation manager, Pittsburgh Coal Co.; Milton H. Fies, vice-president in charge of operations, DeBardeleben Coal Corporation, and E. B. Nelson, coal washing engineer, Tennessee Coal, Iron & Railroad Co. Officers chosen are: president, C. L. Bransford, general superintendent, Republic Steel Corporation mines, Sayreton, Ala.; vice chairmen, Karl Landgrebe and A. J. Blair, Tennessee Coal, Iron & Railroad Co.; treasurer, J. R. Cudworth, director, school of mines, University of Alabama; secretary, T. C. DeSollar, Woodward Iron Co.

Mr. Morrow's talk was on "Coal-Washing Practice in Pennsylvania," in the course of which he gave a demonstration of recovering coal or iron ore rapidly from water used in washing. Using test tubes in a vertical position, he showed how quickly the coal or ore can be settled by the addition of potato starch, the ratio being about 1 lb. of starch to a ton or more of sludge. He added that, because of natural handicaps, the Alabama field probably has developed methods for cleaning coal to a greater extent than any other field. He also discussed problems in loading, hand picking, overcoming climatic conditions such as extreme cold, controlling moisture in coal, recovering water used in washing, and maintenance of uniformity in product.

Coal washing and cleaning received consideration from the standpoint of the commercial producer by Mr. Fies, and from the captive-mine viewpoint by Mr. Nelson.

Coal Bill Passes House Unchanged; Favorable Report to Senate

WASHINGTON, D. C., March 25—Action in Congress toward readoption of bituminous-coal-control legislation has speeded up with a favorable report on the Guffey-Vinson bill on Monday by the Senate Committee on Interstate Commerce following its passage by the House on March 11. Passage by the House came after a vigorous speech in behalf of the measure by Speaker Bankhead. There was no record vote.

Amendments adopted by the Senate subcommittee (Senators Neeley, West Virginia; Minton, Indiana; Moore, New Jersey; Austin, Vermont, and Davis, Pennsylvania) were mostly of a clarifying nature, though one was accepted which would authorize the Coal Commission to remove any district board member after full hearing for inefficiency, willful neglect of duty or malfeasance in office. The farmer cooperative exemption was restored, despite the contention of Senator Austin that it would create discrimination. A change was made permitting the Commission to conduct research work of rather broad scope. The penalty against buyers of coal who knowingly purchase in violation of the code was reduced from $5 per ton to $1. The penalty for failure of a producer to file reports was increased to $100 for each day of failure to do so after 15 days after notice of default, instead of 30 days, as formerly.

Several other proposals were voted down, among them one by Senator Davis that there be only five members on the Commission, instead of seven, and that two of them represent labor. Another that missed adoption by a three to two vote was an attempt by Senator Davis to have the bill comply with "the President's request to conform to the civil service law."

When the bill was read in the House for amendments under the five-minute rule, many changes were proposed, but all were rejected, the measure passing in the exact form as reported by the committee (*Coal Age*, March, p. 138). Among the amendments offered was one by Representative Mapes, of Michigan, that would require civil service status of all employees charged with enforcement of the act except the Commissioners. Reduction of the excise tax to one-quarter of one per cent instead of one-half of one per cent was suggested by Representative Merritt, of New York. Representative Boileau, of Wisconsin, wanted the farmer cooperative exemption restored.

Casey Offers Amendments

Changes urged by Representative Casey, sponsor of the "Coal Trade Act of 1937," included a provision that all contracts entered into up until the date of approval of the act be made valid. He also sought to insert a new subsection which would declare it not to be an unfair trade practice for any operator to sell coal at a price below the established minimum if in so doing he covered the aggregate costs of production and sale of such coal. Finally, Mr. Casey offered a proviso that the code should become effective only "whenever acceptances for membership therein shall have been received from the producers of two-thirds" of the aggregate tonnage subject to the provisions of the act.

Except for the significant change in the table of minimum-price areas whereby west Kentucky, Illinois, Indiana and Iowa were separated from Area 1 and set up as Area 2, as well as the changes in the excise and compliance taxes (*Coal Age*, March, p. 138) and the elimination of labor provisions, the measure is fundamentally the same as the coal acts of 1935 and 1936.

In moving for passage of the bill, Representative Vinson emphasized that its purpose was the regulation of interstate commerce in bituminous coal and to matters or transactions in or directly affecting such traffic. Reliance, he added, was placed solely on the commerce clause in the Constitution. Answering the argument that the measure would increase the price of

Coming Meetings

- Utah Coal Operators' Association: annual meeting, April 7, Salt Lake City, Utah.
- Virginia Coal Operators' Association: annual meeting, April 10, Norton, Va.
- Ohio Coal Control Association: annual meeting, April 19, Cleveland, Ohio.
- Central Pennsylvania Coal Producers' Association: annual meeting, April 20, Altoona, Pa.
- American Mining Congress: annual convention and exposition, May 17-20, Music Hall, Cincinnati, Ohio.
- Fourth short course in coal utilization: May 25-27, University of Illinois, Urbana, Ill.
- Big Sandy-Elkhorn Coal Operators' Association: annual meeting, June 1, Ashland, Ky.
- Mine Inspectors' Institute of America: annual convention, June 21-23, Deshler-Wallick Hotel, Columbus, Ohio.
- Mining Society of Nova Scotia: annual meeting, June 21-23, at Nova Scotian, Halifax, N. S.
- American Society for Testing Materials: annual meeting and exhibition, June 28-July 2, Waldorf-Astoria Hotel, New York City.

coal to the consuming public, he pointed out that "the actual changes proposed by the district boards under the old act in the North Atlantic cities amounted to an increase in the price of industrial coal of 7c. a ton, from $1.86 to $1.93, and a reduction in the price of lump coal of 30.7c., from $2.25 to $1.94."

In framing the present act, said Mr. Vinson, an effort had been made to meet court decisions. He instanced the fact that instead of empowering the district boards to establish prices, as in the 1935 act, the present bill authorized the boards to propose the prices, and the minimum prices are established by the Bituminous Coal Commission, a federal agency. What was sought, he added, was stabilization of the industry that would permit a fair return upon the investment to be made under the control of a federal agency, so that there would be an opportunity for a fair wage to be paid to the men who produce the coal. In response to a question he said that aside from the tax imposed there would be no additional financial responsibility for the administration of the act.

Bill Wins New Advocate

Representative Fish, of New York, declared it his belief that the measure under consideration not only was constitutional but was an improvement on the Guffey-Vinson bill that passed the House last June. Though he did not consider the measure perfect, he said, in view of the fact that many operators, miners and even the public had asked for relief from certain intolerable aspects of the industry, "why vote against the only proposition that is presented to relieve the situation?"

Indorsing the constitutionality of the latest Vinson bill, Representative Jenkins, of Ohio, held that it is not necessary that business be impressed with a public interest or be a monopoly to be subject to price-fixing legislation. Furthermore, he asserted that the bill was not to be taken as an indication that the operators and miners were getting ready to gouge anybody. Coal is such a necessary and useful commodity and is produced so cheaply that he thought the bill ought to pass in order to revive an industry so important to the nation. He added that an independent study would disclose that the most likely opponents of the bill are those who have been getting "priorities, rebates or favors."

In support of the measure, Representative McCormack, of Massachusetts, stressed the conservation features. In addition, he asserted that it fairly covered all of the constructive features of the various proposals made during the last 20 years for remedying distressing conditions in the industry. Provisions for the protection of the consuming public, he held, are stronger than in any other bill ever proposed. In proof of which he cited the extraordinary powers given the Consumers' Counsel with respect to summoning witnesses, in representing the public in all hearings before the Commission and in initiating hearings where the welfare of the consumer requires it. In addition, he pointed out that the Consumers' Counsel reports direct to Congress.

Along the same line, Representative Dingell, of Michigan, pointed out that the Consumers' Counsel has the right to intervene at any time or at any place whenever in his estimation the consumers' interests are involved, much less jeopardized. Another phase of the bill he commended was "the conservation feature which will follow in the wake of sane competition." The American public, he charged, is spending natural resources like a drunken sailor, with no consideration whatever for future generations.

Representative Focht, of Pennsylvania, though impressed by the argument of Mr. Vinson on the constitutionality of the bill, gave it as his opinion that "you cannot tell whether it is constitutional until you try it." He admitted it was clearly manifest, however, that there was some dislocation in the industry, and said that if something were not done pretty soon he would have to get together a lot of miners from his district and draft legislation.

Replying to charges that the bituminous coal industry is dying, Representative Randolph, of West Virginia, cited the upturn in production during the last two years. Therefore, he said that if it was dying it was not for lack of markets but rather was due to ills within the industry itself. Thereupon he read a letter from John L. Lewis, in which the U.M.W. president said the mine workers are "vitally interested in legislation that will end the practice of seeking markets at any price and cutting wages to attain that miserable objective." The letter said, further, "it is my desire to see profits accrue to the operators and those who have financially invested in the industry; to see added safety and security for all those affected."

Representative Edmiston, of West Virginia, cited the beneficial effects of the Guffey bill of 1935, before its demise, in bringing peace and prosperity to the bituminous industry and urged passage of the present version. He also said that there would be no increase in prices to domestic consumers, though prices probably would be higher for railroads, utilities and manufacturers. However, he said this is as it should be, since in the past many large consumers took unfair advantage of the operators' inability to store slack.

Attention was directed to the improvement in conditions under N.R.A. and the Guffey act of 1935 also by Representative Imhoff, of Ohio. Since the rejection of those measures, he said, cut-throat competition is again coming into play, and unless something is done the coal business will be back in the same state it was before the advent of N.R.A. "I believe the necessary remedy is provided in the present bill. Its provisions are vital to the interests of one-half million miners in this country, as well as the investment of hundreds of millions of dollars by the operators."

Fears for Lignite Prospects

Representative Case, South Dakota, disavowed any intention to quarrel with the aims of the bill, as he heartily desired to see stabilization of the industry and improvement in the economic condition of the workmen. However, he was unable to reconcile contentions on the one hand that the provisions of the bill do not apply to the small operator and, on the other, that "coal mined in any State competes with coal mined in every other State." The speaker was perturbed over possible effects on the lignite industry of his State, which he believed to have a future in the right direction—ahead.

Leading off for the opposition, Representative Reed, of New York, held that, despite the contention of the bill's supporters that the illegal provisions of the original Guffey act had been eliminated, its chief purpose was to coerce compliance with a code that will give a monopoly to large coal producers at the expense and ruin of small producers. Non-code operators will be forced out of business, being unable to pay the 19½ per cent tax. The effect of the bill, if put in operation, he added, would be to raise prices. "Those who are accessible to fuel oil will shift from coal to oil. This will bring a demand from the coal producers to tax fuel oil from the field of effective competition. There is no end to price fixing once the government embarks on such a program."

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JANUARY STOKER SALES EXCEED YEAR AGO

Sales of mechanical stokers in January, 1937, totaled 3,103 units, according to statistics furnished the U. S. Bureau of Mines by 108 manufacturers (Class 1, 67; Class 2, 30; Class 3, 34; Class 4, 33; Class 5, 11). This compares with sales of 5,822 units in the preceding month; 2,550 in January, 1936, and 1,588 in January, 1935. Classifications in the latest report have been changed to agree with the new schedule form (*Coal Age* December, 1936, p. 606), the new classes 1 and 2 combined being practically equivalent to former Class 1; Class 3 about the same as the former Class 2, and classes 4 and 5 combined practically equivalent to the former Class 4. Sales by classes in January were: Class 1 (under 61 lb. of coal per hour), 2,516 (bituminous, 2,225; anthracite, 291); Class 2 (61 to 100 lb. per hour), 198; Class 3 (101 to 300 lb. per hour), 185; Class 4 (301 to 1,200 lb. per hour), 143; Class 5 (over 1,200 lb. per hour), 61.

Representative Casey, of Massachusetts, took issue with proponents of the bill who cited the *Nebbia* milk case in New York as a precedent in price fixing, declaring "that is no authority for saying as a general proposition that this government can fix minimum prices in private industry." That case was without value as a precedent, he said, where no question of public health was concerned. Furthermore, he contended that, as 42.6 per cent of the traffic in bituminous coal is intrastate, fixing only interstate prices "would get you nowhere." Questioned on the difference between the Casey bill and the Vinson bill, the speaker said that, while they both seek to eliminate cut-throat competition, his bill proposes to do it by allowing the industry to regulate itself, under supervision. On the other hand, the Vinson act, he said, seeks a strict governmental regulation by compulsion.

If the Vinson bill would accomplish what was claimed for it by its sponsors, said Representative Crowther, New York, he would be tempted to vote for it, but he said he did not think it would do so. He declared that the situation showed the necessity for an amendment to the Constitution. The price-fixing provisions of the bill, he said, are still open to question. In addition, he held that the compliance tax is coercive. "If this bill is declared constitutional," he said, "why may we not expect to have similar legislation for every existing industry in this country?" The fact is, he concluded, "that this administration is just patting the coal miner on the back with a bill of this kind, and then, by appropriating $200,000,000 during the past four years for hydro-electric development, is giving the same coal miner a kick in the pants at the same time."

Progressives Launch Attack

A statement entitled "Why the Progressive Miners of America Object to the Guffey Coal Bill" was added to Mr. Crowther's remarks. The statement said, in part: "The revised bill is cleverly drawn; full of ambiguous phrases which mean nothing other than a surface reading would indicate, and cover, through inference and clever evasion, the same fields of price fixing, coercion, taxation and dictatorial bureaucratic control that the first bill incorporated. It carries the same artificial control of industry scheme as its predecessor, and, if enacted into law, would pave the way for the elimination of hundreds of coal mines from operation and tens of thousands of coal miners from the industry."

Representative Taber, New York, professed to see in the Vinson bill the placing of too much power in the hands of large producers to the disadvantage of small ones. The fixing of minimum prices, too, he held, would restrict markets because of the competition of hydro-electric power, natural gas and fuel oil. "Only because fuel-oil prices are maintained as a result of restrictions on production at the present time has it been possible for the bituminous-coal industry to obtain any price at all."

In somewhat similar vein, Representative Treadway, Massachusetts, said the choosing of board members on a tonnage basis gave the industry itself power to fix minimum prices. He pointed out that the bill does not provide primarily for government regulation against "excessive" prices. Speaking further from the consumers' standpoint, the speaker said that provisions in regard to members of the Coal Commission assured the coal industry a working majority and added that, "as a matter of fact, there is nothing in the bill to prevent the entire Commission being composed of men with the coal industry's point of view." The consumer, he added, is almost entirely out of the picture. He can turn to other fuels such as fuel oil and natural gas, however. These substitutes, in fact, have already made heavy inroads into the market for coal, he said, and any effort of operators to raise the price of coal will inevitably lead to increased use of these other fuels; "thus this bill may prove a boomerang to the coal industry."

Senator Logan, of Kentucky, introduced in the Senate on March 1 S. 1735, a companion to the Casey bill (H.R. 3666) previously introduced in the House (*Coal Age*, March, p. 138). The bill was referred to the Committee on Mines and Mining, of which Senator Logan is chairman. On March 9 a subcommittee was named consisting of Senators Thomas (Utah), Davis (Pennsylvania) and Hayden (Arizona) to consider the measure. The latter group submitted the bill to the Department of Commerce, the Bureau of Mines and the National Bituminous Coal Commission for comment, deferring action until reports are received from those agencies.

Nationalization of coal was urged by Representative Harry Sauthoff, of Wisconsin, in an address from the floor of the House on March 5 in behalf of a bill (H.R. 5138) he introduced for that purpose. Alleging that the situation in the industry was becoming unbearable, the speaker asserted that such measures as the Guffey bill were mere palliatives. What he wanted to do, he explained, was to "increase the pay of the miners while reducing the cost to the consumer. This can be done," he asserted, "only by taking private profits out of the coal industry. Under public ownership and democratic administration the industry will find out how much coal the people want, how much of the supply there is in stock, what is the cost of mining coal, how much pay a miner gets and what is the correct price of a ton of coal. A permanent fact-finding agency will be one of the instruments of control."

GAS-LINE PROJECT ATTACKED BY ANTHRACITE MAN

A proposal to pipe natural gas into Pennsylvania cities through pipe lines that would run within fifteen miles of anthracite mines was vigorously attacked by Norman F. Patton, Anthracite Institute, speaking at the 30th annual convention of the Pennsylvania Retail Coal Merchants' Association, held March 11 at Reading. He emphasized the menace to employment of thousands in the collieries, on the railroads and in coal yards, one of the worst features, he pointed out, being the fact that 70 per cent of the tonnage in the area affected comes from the Southern anthracite field, where the bootleg mining is so acute.

Though spokesmen for the gas interests announced on March 2 at Harrisburg that present plans contemplate furnishing natural gas to only four existing companies doing business in that city, Lebanon, Allentown, Reading and Bethlehem, there is no assurance, said Mr. Patton, that natural gas will not be introduced into others of the 98 townships in nine counties traversed by the proposed pipe line.

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Personal Notes

W. H. AMICK has been appointed superintendent of the Minden mine of the New River & Pocahontas Consolidated Coal Co., Minden, W. Va.

LLOYD ANDERSON, formerly mine manager at Harrisburg No. 43 mine of the Peabody Coal Co., at Harrisburg, Ill., has been made superintendent there.

FRED BURNETT, formerly superintendent of Black Arrow No. 18 mine of the Peabody Coal Co., at West Frankfort, Ill., has been appointed superintendent of Harco No. 47 mine, Harco, Ill.

RAY BUZZARD has been named foreman of Bergoo No. 2 mine of the Pardee & Curtin Lumber Co., Webster Springs, W. Va.

C. W. CREWS has been made superintendent of the Sewell Smokeless Coal Co., in Raleigh County, West Virginia.

R. G. DANIELS has been appointed general mine foreman by the Sewell Smokeless Coal Co., in Raleigh County, West Virginia.

CHARLES GALLAGHER has been made mine foreman by the Hitchman Coal & Coke Co., Wheeling, W. Va.

E. GAMMETER, of the Bell & Zoller Coal & Mining Co. engineering corps, Zeigler, Ill., has been made chief engineer, succeeding J. M. Johnston, promoted.

HARRY GERDES, formerly a top employee at No. 6 Crescent mine of the Crescent Mining Co., Peoria, Ill., has

been made top boss there, vice John Marie, promoted.

HENRY J. HAGER, formerly in the engineering department of the Alabama By-Products Corporation has been made superintendent of the company's Colta mine, Walker County, Alabama, vice John W. Hager, transferred.

JOHN W. HAGER, formerly superintendent of the Colta mine of the Alabama By-Products Corporation, has been appointed superintendent of the company's Praco mine, in Walker County, Alabama.

C. F. HARDY, formerly steam power engineer at the New Castle (Ind.) plant of the Chrysler Corporation, has joined the fuel engineering staff of Appalachian Coals, Inc., Cincinnati, Ohio.

J. C. HELVEY has been named general foreman of the Minden mine of the New River & Pocahontas Consolidated Coal Co., Minden, W. Va.

JOHN HILTON has been appointed foreman of No. 6 mine of the Leccony Smokeless Coal Co., Raleigh County, West Virginia.

P. S. HOLDREN has been named assistant superintendent of No. 7 mine of the Koppers Coal Co., Powellton, W. Va.

T. D. HUGHES has been made foreman of Hartley mine of the Greer Gas Coal Co., Brownton, W. Va.

WILLIAM INGLE, JR., has been made general superintendent of the Ingle Coal Co., Oakland City, Ind., vice Herman Bryant, deceased. Mr. Ingle, who is a graduate engineer, is the son of W. D. Ingle, vice-president of the company.

ALLEN J. JOHNSON, director, Anthracite Industries, Inc., laboratory at Primos, Pa., has been appointed a member of the committee on correlation of research of the American Institute of Mining and Metallurgical Engineers and has been renamed to the committee on use of coal.

J. M. JOHNSTON has been appointed assistant general manager of the Bell & Zoller Coal & Mining Co., operating in Franklin County, Illinois. He has been chief engineer for the last nine years.

A. T. LIPSCOMB has been appointed foreman of Anjean mine of the Leckie Smokeless Coal Co., Anjean, W. Va.

JOSEPH MAIER has been made foreman of Costanzo mine of the Wheeling Coal Co., Wheeling, W. Va.

C. J. MCDONALD, formerly assistant electrical engineer, Susquehanna Collieries Co., Nanticoke, Pa., has become electrical engineer for the Weirton Coal Co. at its Isabella mine, Isabella, Pa.

JOHN MARIE, heretofore top boss at No. 6 Crescent mine of the Crescent Mining Co., Peoria, Ill., has been named master mechanic by the company, vice William McNail, promoted.

WILLIAM MCNAIL, hitherto master mechanic at the Crescent mines, Peoria, Ill., has been placed in charge of the Bell & Zoller Coal & Mining Co. washery at Zeigler, Ill., as superintendent.

CARL MONCY has been named foreman of No. 2 mine of the Central Pocahontas Coal Co., Anawalt, W. Va.

S. J. MONTGOMERY has been appointed assistant to the superintendent of the Hitchman Coal & Coke Co., Benwood, W. Va.

W. D. NUNN has been made foreman of No. 7 mine of the Koppers Coal Co., Powellton, W. Va.

C. A. PEARSE, superintendent of Republic No. 5 mine of the Carbon Fuel Co., Jochin, W. Va., has been transferred to take charge of the company's river docks at Chesapeake.

ERSKINE RAMSAY, chairman of the board, Alabama By-Products Corporation, has been reelected to the Birmingham (Ala.) Board of Education for a five-year term beginning April 1. He has been on the school board since 1922.

C. A. REED has been appointed secretary of Bituminous Coal Research, Inc., succeeding Oliver J. Grimes, who has accepted employment that necessitated his removal from Washington, D. C. Mr. Reed, being in charge of the engineering department of the National Coal Association, sponsor for B.C.R., will coordinate the engineering work of both organizations. Since joining the N.C.A. staff he has been studying research, combustion and engineering problems to promote the use of bituminous coal.

J. A. ROWE has been named assistant superintendent of No. 5 mine of the Koppers Coal Co., Powellton, W. Va.

BYRON W. SLEPPY, hitherto general sales manager of the Stevens Coal Co., Wilkes-Barre, Pa., has been made vice-president.

D. R. SULLIVAN has been appointed safety director of Nos. 1 and 2 mines of the Milburn By-Products Coal Co., Milburn, W. Va.

L. S. WOOD, vice-president of the Greenough Coal Co., Hellier, Ky., has been made president of the newly formed Bell Coal & Transportation Co., Chicago.

PERMISSIBLE PLATES ISSUED

THREE approvals of permissible equipment were issued by the U. S. Bureau of Mines in February, as follows:

Goodman Manufacturing Co.: Type 512-CL3 shortwall mining machine; 50-hp. motor, 220-440 volts, a.c.; Approvals 312 and 312A; Feb. 1.

Chicago Pneumatic Tool Co.: No. 572 drill; 1.5-hp. motor, 220 volts, a.c.; Approval 313; Feb. 19.

National Carbon Co., Inc.: Eveready safety-type flashlight (fiber-case model); Approval 605; Feb. 24.

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Holmes Awards to 34 Mines

Among the recipients of certificates of honor from the Joseph A. Holmes Safety Association for meritorious safety achievement in 1936 were 34 mines of 26 coal-mining companies. The coal companies so honored are:

Alta Coal Co., Summit mine, Summiton, Ala.
Buckeye Coal Co., Nemacolin mine, Nemacolin, Pa.
Calumet Fuel Co., Somerset mine, Somerset, Colo.
Carnegie Coal Corporation, Pittsburgh, Pa.
Colorado Fuel & Iron Corporation, Morley, mine, Morley, Colo.
Consolidation Coal Co., mine No. 206, Jenkins, Ky.
Consumers Mining Co., Harmar mine, Harmarville, Pa.
Crucible Fuel Co., Crucible mine, Crucible, Pa.
Diamond Coal Co., Providence, Ky.
Elkhorn Piney Coal Mining Co., Coxton mine, Coxton, Ky.
Franklin Coal Mining Co., Powhatan mine, Powhatan, Ala.
Helvetia Coal Mining Co., Yatesboro No. 5 mine, NuMine, Pa.
Industrial Collieries Corporation, Johnstown division, Johnstown, Pa.
North-East Coal Co., Thealka, Ky.
Peabody Coal Co., No. 43 mine, Harrisburg, Ill.
Pickands, Mather & Co., Mather collieries, Mather, Pa.
Pittsburgh Coal Co., Montour No. 10 mine, Library, Pa.; Somers mine, Pricedale, Pa.; Westland mine, Westland, Pa.; Arnold mine, Fayette City, Pa.; Banning No. 2 mine, Whitsett, Pa.
Pocahontas Fuel Co., Pocahontas, Va.
Republic Steel Corporation, Northern coal mines, Martin, Pa., and McIntyre, Pa.
Rochester & Pittsburgh Coal Co., Helvetia mine, Helvetia, Pa., and Kent No. 2 mine, McIntyre, Pa.
Stonega Coke & Coal Co., Arno colliery, Arno, Va., and Stonega colliery, Stonega, Va.
United Electric Coal Cos., mine No. 11, Duquoin, Ill.
United States Fuel Co., King mine No. 2, Mohrland, Utah.
Valier Coal Co., mine No. 1, Valier, Ill.
Woodward Iron Co., Dolomite mine, Woodward, Ala., and Mulga mine, Mulga, Ala.
Youghiogheny & Ohio Coal Co., Charleroi mine, Charleroi, Pa.

Bootleg Inquiry Begins

The anthracite investigation commission named by Governor Earle of Pennsylvania (*Coal Age*, March, p. 128) to make an inquiry into the bootleg mining industry began a tour of the region around Pottsville on March 4. While inspecting improvised operations, the commissioners questioned the miners on existing conditions. In every instance the men said they were anxious to get back to regular jobs as soon as possible.

In beginning a survey of bootleg

activity, W. Jett Lauck, chairman of the commission, said it was his aim to approach the problem with "sympathy for both of the main factors involved—the property rights of the companies owning the coal lands and operating the mines, and the human rights of the miners, who, I am told, took up the selling of company-owned coal as their only means of livelihood after certain mines were closed."

At the conclusion of their tour, the Commissioners arranged to hold public hearings in Pottsville, Shamokin, Shenandoah and Mahanoy City. At these sessions, operators, miners, business men and the bootleggers will be encouraged to present suggestions to correct disordered conditions.

Financial Reports

American Coal Co. of Allegany County—Net loss for 1936, $189,929, compared with net profit in 1935 of $45,723.

Clinchfield Coal Corporation—Net operating loss for 1936, $210,139, exclusive of credit of $1,629 from purchase of preferred stock at less than par. This compares with net operating loss in 1935 of $67,754, excluding credit of $18,007 from purchase of preferred stock at less than par.

Consolidation Coal Co. and subsidiaries—Net loss for 1936, $73,279 after interest accrued for 1936 on sinking-fund bonds. For the second half of the year, profit available for interest on 25-year 5 per cent sinking-fund bonds was $252,554 after interest on notes and loans, compared with profit of $91,356 for the first half.

Electric Shovel Coal Corporation—Net income for 1936, $77,583, compared with $39,230 income in 1935.

Glen Alden Coal Co. and subsidiaries—Net income for 1936, $2,782,484, compared with $1,757,290 in 1935.

Lehigh Navigation Coal Co.—Loss for 1936, $759,530 after depletion, depreciation, taxes and interest, compared with $1,543,736 loss in 1935.

Pittsburgh Coal Co.—Net loss for 1936, $1,684,955 after all charges, including depletion, depreciation and $259,299 loss principally on disposal of certain capital assets of Pittsburgh Coal Co. of Wisconsin, Pike-Floyd Coal Co. and New Pittsburgh Coal Co. This compares with net loss of $691,326 in 1935.

Pittsburgh Terminal Coal Corporation and subsidiaries—Net loss for 1936, $526,432, against $538,005 loss in 1935.

Truax-Traer Coal Co. and subsidiaries—Consolidated net profit for quarter ended Jan. 31, $340,469, excluding discount on debentures purchased for sinking-fund requirements; of this amount, $103,235 represents the company's proportion of earnings for the same period from properties formerly owned by Truax-Traer Lignite Coal Co., merged on Dec. 31, 1936. Truax-Traer Coal Co. earned $170,344 in the same period a year ago, while Truax-Traer Lignite earned $95,905.

Virginia Iron, Coal & Coke Co. and subsidiaries—Consolidated net loss for 1936, according to pamphlet report, $91,950, compared to $87,395 loss in 1935. Excluding subsidiaries, the company showed a net loss of $88,404 last year, against $84,124 loss in the preceding year.

West Virginia Coal & Coke Corporation and subsidiaries—Net loss for 1936, $79,981, against net profit in 1935 of $361,037.

Monarch Mine Closed

The Monarch Anthracite Mining Co., Scranton, Pa., of which James H. Pierce is president, has halted operations at Plains Township indefinitely, throwing 250 men out of work. The company reported that the operation was not profitable. A movement is said to be under way, however, to determine if one seam can be worked with profit, which would provide employment for 150 men.

To Sell Colorado Plants

Plants and equipment of the Alamo and Barbour coal companies, at Alamo, Colo., are to be sold at public auction April 8 in the Post Office Building, Denver. According to a notice signed by Frank McLaughlin, referee in bankruptcy, and F. W. Whiteside, trustee, 192 dwellings, mine structures, machinery and 185 pit cars will be included.

Safety Institute Organized

The Big Sandy-Elkhorn Mining Institute, having for its objective the promotion of safety in coal mining, was organized March 1 at a meeting of forty coal-mining men held in Pikeville, Ky. Charles Southerland, safety director, Wheelwright mines, Inland Steel Co., Wheelwright, Ky., was chosen president. The new organization purposes holding meetings throughout the Big Sandy-Elkhorn field to teach safety to all mine employees.

More Permanent Shows

Permanent exhibits of modern anthracite burning equipment are to be established in Philadelphia, Pa., and Boston, Mass., within the next two months by Anthracite Industries, Inc., according to an announcement by F. W. Earnest, Jr., president. The men in charge of these showrooms will cooperate with coal merchants, equipment manufacturers and dealers to promote increased sales of anthracite equipment. The organization is working with coal dealers and heating contractors in other localities, Mr. Earnest said, so that as fast as possible showrooms will be set up in every major city. Additional men also are being placed in the field to work more closely with allied interests.

Revision of Test Methods Planned by Coal Group

Revision of grindability, sampling and friability tests of coal is contemplated by Committee D-5 on Coal and Coke of the American Society for Testing Materials, of which A. C. Fieldner, chief, Technologic Branch, U. S. Bureau of Mines, is chairman. At a meeting of the committee held March 1 at Chicago, the committee agreed to recommend extensive revisions of the Tentative Method of Test for Grindability of Coal by the Hardgrove-Machine Method (D 409-35 T) to shorten the test procedure by eliminating the large number of sieves now required for size testing the ground coal. In the revised procedure only one sieve (the No. 200) is used for this purpose at the completion of the test. Revisions contemplated in the Tentative Method of Test for Grindability by the Ball-Mill Method (D 40835 T) include a rapid control method suitable for use on coals the general grindability characteristics of which are known. This method requires only about one-half the time of the standard procedure which is recommended for testing coals of unknown grindability characteristics.

In the standard method of sampling, a revision will be submitted to provide a scheme of crushing and reducing gross samples by mechanical crushers and riffler samples. It is believed that a well-standardized mechanical method should be more accurate because of the elimination of personal errors inherent in hand methods of preparing coal samples for shipment to the laboratory.

Two methods for testing coal friability were approved for presentation as tentative standards to the society at the annual meeting this year in New York. One method is a tumbler test and the other a drop shatter test. These have been published for information in the book on "A.S.T.M. Standards for Coal and Coke."

Organization also was completed of a new subcommittee on plasticity and swelling of coal. This group, at a meeting held in Chicago, agreed to investigate methods for determination of plastic properties of coals and their expansion when heated or burned.

Investigation of these methods will be made both in connection with evaluating coals for coke making and as affecting their characteristics in the fuel bed.

Mineral Conference Put Off

Departing from its former practice of holding an annual meeting in the spring, the fifth annual Illinois Mineral Industries Conference will be held at the University of Illinois, Urbana, on Oct. 8-9. In announcing the dates for the 1937 conference, E. M. Leighton, chief of the Illinois State Geological Survey, indicated that all future meetings probably will be held in the autumn.

Appalachian Conferees Near Deadline For Making New Wage Contract

NEGOTIATIONS for new bituminous wage agreements were at a critical stage because of the time element as this issue of *Coal Age* went to press on March 25. With less than a week remaining before existing contracts throughout the country were scheduled to expire, conferees wrestling with the problem of basic scales and working conditions for the Appalachian districts had reached no agreement on the demands and counter-demands presented at the opening session of the joint conference on Feb. 17 (*Coal Age*, March, 1937, p. 134). Conferences in outlying districts were stymied pending a decision on Appalachian wages.

A meeting of the Appalachian joint conference, originally set for March 25 at New York City, was postponed temporarily because of the absence of John L. Lewis, president, United Mine Workers, who had been summoned to Lansing, Mich., the preceding day by Governor Murphy in an effort to break the deadlock and end the sit-down strikes at the Chrysler automotive plants. A general meeting of the Appalachian operators, which was to have been held March 24, was delayed a day because some of the committee members were unable to reach New York in time.

Small Groups Hold Conferences

Although the joint scale committee has held many sessions since the first general conference in February, no official announcements beyond two statements covering the creation of smaller subcommittees to carry on discussions have been forthcoming. Following separate group caucuses on March 10, a subcommittee of eight, with Duncan C. Kennedy, chairman of the conference, and Mr. Lewis as ex-officio members, was appointed. P. C. Thomas, vice-president, Koppers Coal Co., was named on this subcommittee to represent the Southern high-volatile fields; L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co., the Southern low-volatile fields; Walter Robison, president, Youghiogheny & Ohio Coal Co., and Charles O'Neill, president, United Eastern Coal Sales Corporation and chairman of the operators' negotiating committee, to represent the Northern districts, William Turnblazer, president, District 19; Samuel Caddy, president, District 30; James Mark, president, District 2, and John Owens, president, District 6, were made subcommittee spokesmen for the mine workers. On March 13, the subcommittee was shrunk to Messrs. O'Neill and Putman for the operators and Mr. Lewis and Thomas Kennedy, secretary-treasurer, United Mine Workers, for the miners.

Illinois operators and representatives of the United Mine Workers in District 12 met in joint conference at Chicago on March 11. W. J. Jenkins, president, Consolidated Coal Co., was elected chairman of the conference; D. W. Buchanan, president, Old Ben Coal Corporation, vice-chairman, and Walter J. James, secretary-treasurer, District 12, secretary. Complications in negotiating a new contract for that State are envisaged because District 12 has demanded that the United Mine Workers be recognized as the sole bargaining agency for all Illinois miners. The Progressive Miners' Union, which now has contracts with a number of operators in the State, also has presented a series of demands.

While the Appalachian conferences were in session last month, Rocky Mountain operators also came to New York to discuss the wage situation with union officals. Among the specific suggestions made by the operators' committee were a proposal for continued operation in the Rocky Mountain area in the event there should be a suspension in the districts east of the Mississippi River on April 1 and an appeal for a provision in the new Rocky Mountain contract which would permit the mines there to work six days per week for a maximum of twelve weeks in any one year so that peak demands—largely domestic—might be taken care of without serious difficulty. Eugene McAuliffe, president, Union Pacific Coal Co., headed the operators' delegation.

Undertone Is Optimistic

Despite the immediate impasse and the apparent determination on the part of some producers to make no new counter-proposals on possible wage adjustments until the union recedes from its position on a guaranteed work-year of 200 days and vacations with pay, the undertone is one of optimism. If the reconvened conference should result in a stalemate, there is a possibility that an agreement will be made to continue operations at the mines pending further negotiations. If such a proposal should not be accepted directly, it is almost a foregone conclusion that Washington will step into the picture and endeavor, as it did successfully in 1935, to forestall a suspension. And, of course, last-minute agreements without outside intervention are not unknown in the coal industry.

Average wages in the bituminous industry approximated $1,125 last year, according to a study entitled "Income From Bituminous Coal Mining," made public by the National Industrial Conference Board March 16. This average was $10 higher than that reported for the manufacturing industries the same year. In 1929, the report stated, average annual earnings for the bituminous mine worker were approximately $1,250. Decreased wage rates and shorter running time pulled this average down to $662 in 1932. Since that time, increases in base rates and in number of days the mines have worked have boosted average earnings 70 per cent.

The "real" value, or purchasing power, of the average wage last year, declares the study, was about $70, or 6 per cent, higher than in 1929. This was due, it was explained, chiefly to the fact that the recovery of wages since 1932 has been much more rapid than the increase in the cost of living. The averages used in the National Industrial Conference Board report are based upon 1929 returns to the Bureau of the Census and estimates for subsequent years based upon a projection of the wage and employment trends published by the Bureau of Labor Statistics.

Methods of Calculations Vary

In 1929, according to the Census, there were about 459,000 wage earners employed in the soft-coal industry, but, according to the Bureau of Mines, there were about 503,000. The apparent discrepancy between the two sources results from differences in the method of calculating the average number of wage earners employed during the year. The Census figure is derived by adding the number of wage earners on the payroll on the 15th day of each month and then dividing by 12. Thus the Census figure is a yearly average of the men actually drawing pay on the 15th of each month. On the other hand, the Bureau of Mines figure "represents a typical payroll when the mine is in operation and includes all mines that may have operated at any time, however short, during the year." Thus a mine employing 200 men and operating in January, February and March, shutting down for the next six months, and operating again in October, November and December, would be represented in the Bureau report by 200 men and in the Census returns by only 100.

The Bureau of Labor Statistics collects both employment and payroll data from about 1,400 bituminous coal mines covering probably more than half the workers in the industry. These data represent actual wages paid during the week ending nearest the 15th day of each month and the number of wage earners, according to payrolls, who worked at any time during the week reported. From these data the percentage changes in payrolls and in employment in identical establishments is computed from month to month, and the percentage changes then put into index numbers, with the 1929 yearly average equal to 100. Yearly indexes are derived by the Bureau of Labor Statistics by averaging the monthly indexes.

How actual earnings in an individual company may differ from the average shown in the study of the National Industrial Conference Board is illustrated by a recent check of the 1936 payroll of the Hanna Coal Co. of Ohio. This showed average earnings per man of $1,484.60. Hanna mines averaged 260 days last year, making the average earnings per man $5.71.

Average wages, the study of the National Industrial Conference Board points out, are affected by variations in the size of the establishment and in the number of days worked. These variations are considerable in the bituminous coal industry. The average

wage is materially higher for workers employed by large operations than for those employed in small mines. Thus, in 1929, the average for mines employing over 2,500 workers approximated $1,500, as compared with an average of $1,025 for mines employing one to five wage earners.

Variations as between the averages for different States also are marked. These variations, says the report, reflect differences in methods of production, stability of operation and general wage-rate differentials of both union and non-union employees. In 1929, the latest year for which complete figures are available, Alabama had the lowest average wage reported—approximately $950 per annum. Colorado led the field with an average of $1,500 and Indiana reported $1,400. In Illinois, the average amounted to about $1,385; Pennsylvania reported $1,300, and West Virginia averaged about $1,275.

On the basis of 460,000 workers, the average annual wage for the industry as a whole in 1929 was $1,253; in 1930 (430,000 workers), it was $1,091; in 1931 (383,000 workers), $866; 1932 (310,000 workers), $662; 1933, (312,000 workers), $698; 1934 (355,000 workers), $880; 1935 (353,000 workers), $951; 1936 (364,000 workers), $1,123. Wage payments in 1935 absorbed 85.7 per cent of the total income of the industry; in 1929, the figure was approximately 84.5 per cent.

To Reopen Taylor Breaker

Taylor breaker, Taylor, Pa., built in 1911 by the Delaware, Lackawanna & Western R.R. Coal Department and later operated by the Glen Alden Coal Co., is to be reopened by the Moffat Coal Co. Three Menzies cone separators will be moved from the Moffat breaker, the operation of which will be continued with jigs. The Moffat company is working the Taylor and Pyne collieries under lease, and the coal has been going and will continue to go to the Baker breaker of the Glen Alden Coal Co. for treatment. Taylor breaker will clean coal from other Moffat operations.

Advisory Group Appointed

An advisory group of 27 members drawn from industries closely associated with the U. S. Bureau of Mines has been appointed by the Bureau to act in a cooperative capacity. Representatives of the bituminous coal industry, four of whom were renamed from the group chosen two years ago (*Coal Age*, April, 1935, p. 166), are as follows: J. P. Williams, Jr., president, Koppers Coal Co., and president, National Coal Association; L. E. Young, vice-president, Pittsburgh Coal Co.; D. S. Hanley, vice-president, Pacific Coast Coal Co.; H. N. Eavenson, president, Clover Splint Coal Co.; and Eugene McAuliffe, president, Union Pacific Coal Co.

Obituary

H. B. Cooley, vice-president of Allen & Garcia Co., consulting engineers, Chicago, died suddenly on March 23.

Edgar B. Sutton, 55. mining engineer and salesman for Myers-Whaley Co., Knoxville, Tenn., for the last fourteen years, died March 23 of a heart attack while driving his automobile. A graduate of Pennsylvania State College, he had been with the U. S. Bureau of Mines for a time, then chief engineer of the West Virginia Coal & Coke Corporation and later was with Sloss-Sheffield Steel & Iron Co.

Madison Lee Wickliffe, 48, president, Greenville Coal Co., Greenville, Ky., died March 17 at the Kentucky Baptist Hospital, Louisville.

William B. Lewis, 68, former president of the Alamo and Barbour coal companies, operating in Huerfano County, Colorado, died suddenly March 5 of a heart attack in Walsenburg, Colo. He was a mining engineer and was at one time a director of the Colorado School of Mines.

William Trunnell Jones, 48, vice-president and general manager of the Guyan Eagle and Buffalo Chilton coal companies, Amherstdale, W. Va., died March 15 of a heart attack at his home in Huntington. His career in the mining industry began in 1913, when he became mining engineer for the John Laing interests near Elkins. Four years later he became general manager of the Guyan Eagle and Buffalo Chilton companies.

Boost Dustless Treatment

The advantages of dustless treatment of coal were brought home to the consumer at the Builders' Show held in Detroit, Mich., Feb. 19-28, when the Calcium Chloride Association put on a demonstration of dustless vs. untreated coal. The demonstration was made with a two-section glass-inclosed model. In one section, bucket elevators lifted up calcium-chloride-treated coal and then dropped it; in the other section, untreated coal was similarly handled, so that the observer had an opportunity to contrast the dust raised in untreated coal with the dustlessness of the coal which had been treated. Advantages of dustless treatment were further emphasized in a leaflet distributed to visitors.

To Reopen Tejay Mine

The mining property at Tejay, Ky., formerly owned by the old Virginia-Harlan Coal Corporation has been purchased by D. D. Stewart, president, Kentucky Home Coal Co., Pineville, who will operate it as the Lonesome Pine Coal Corporation. Mr. Stewart plans to open up the Lower Harlan seam, which had not been worked by the former owners and which averages over 44 in. in thickness, Approximately $50,000 will be spent for new track, mine cars, cutting machines and other equipment to improve the mine and put it into the 1,000-tons-per-day class. The Tejay tract comprises approximately 1,100 acres of Lower Harlan coal.

Michigan Coal Course Set

A Coal Utilization Institute will be held April 13-15 at the University of Michigan, Ann Arbor. This is the first coal utilization program arranged by the university, and, through cooperation with the Michigan Retail Coal Merchants' Association, more than two hundred dealers are expected to attend. Among the subjects to be discussed are: "The Fuel Engineering Field," J. E. Tobey, manager, fuel engineering division, Appalachian Coals, Inc.; and "Smoke Abatement," T. A. Day, assistant secretary and advertising and public relations director, Appalachian Coals, Inc.

Standard Mine Sold

The Standard mine of the Rocky Mountain Fuel Co., Lafayette, Colo., which had been inactive last year, has been purchased by Kenneth O. Wood, vice-president of the Temple Fuel Co. and the Vickers Coal Co., both operating in Las Animas County, Colorado. The new owner announced that John Trousdale, who has had charge of the Brodhead mine of the Temple company for a number of years, had been appointed superintendent of the Standard operation.

MacBeth Blast Kills 18

An explosion in the MacBeth mine of the Hutchinson Coal Co., about eight miles from Logan, W. Va., on the night of March 11 caused the death of eighteen miners. Rescue workers were hampered in their search for possible survivors and victims by débris from roof falls. Officials of the company said they did not know what had caused the blast. Truman E. Johnson, vice-president, declared that safety devices had been installed in the mine after an explosion there last September and that daily tests had not disclosed the presence of explosive mixtures of gas.

Research Tour Arranged

American industrialists will have an opportunity to observe developments in European coal research this spring during a tour of scientific laboratories being arranged by the National Research Council's division of engineering and industrial research. According to present plans, the group will sail May 14 from New York and will visit research laboratories of eighteen fields

of industry in England, France and Germany, including those of trade associations, governments and universities. In addition, accommodations will be made on the request of any member of the party for side trips to industrial laboratories not included in the general plans.

New Portable Stoker Out

A new portable coal stoker of the overfeed type has been introduced by the Kirby Mfg. Co., Decatur, Ill. By means of a circular distributor device operated by a small motor through reduction gears the coal is distributed evenly over the entire grate area, the distributor being adjustable to varying heights of firedoors. For refilling, the stoker is moved to the coal bin; but, where desired, a screw conveyor can be used to convey the coal to the stoker.

Atlas Coal Stock Sold

The Black Diamond Coal Mining Co., Birmingham, Ala., of which C. S. Bissell is president, acquired the outstanding stock of the Atlas Coal Co., Middlesboro, Ky., during the first week of March. The new owner purposes making improvements and increasing output, with about 400 men employed.

Industrial Notes

LINCOLN ELECTRIC Co. announces the appointment of N. B. Gilliland to the sales engineering staff of its Detroit (Mich.) office. Mr. Gilliland brings a background of 3½ years of university training and one year as assistant instructor in welding at Ohio State University to his new job.

R. G. LETOURNEAU, INC., Peoria Ill., has organized a promotional engineering department with Kenneth F. Park as manager. Mr. Park had been assistant Eastern sales manager.

FOSTER WHEELER CORPORATION has appointed Howard B. Hall regional director in charge of the Cleveland, Cincinnati and Pittsburgh territories with headquarters in Cleveland.

CATERPILLAR TRACTOR Co. has appointed E. R. Galvin as general sales manager. For many years a member of the duPont organization, Mr. Galvin succeeds Vice-President Mee, who has announced his resignation, effective June 1.

FOXBORO Co., manufacturer of industrial precision instruments and controllers, has moved its Atlanta (Ga.) office to the 101 Marietta Street Building.

BUCYRUS-ERIE Co. has appointed the Abrams-Anderson Co., 10425 Northlawn Avenue, Detroit, as distributor in the southern peninsula of Michigan. Ginsberg & Horan, 355 Walton Ave., New York City, has been appointed representative in the metropolitan district.

AMERICAN STEEL & WIRE Co. announces that Dennis A. Merriman has relinquished the title and duties of general sales manager and has been succeeded by John May, formerly assistant general manager of sales. Mr. Merriman will continue as vice-president until he reaches the age of retirement, in September next.

Francke flexible couplings, formerly sold through general sales agents, are now being marketed direct by the JOHN WALDRON CORPORATION, New Brunswick, N. J., owner of the basic patents.

IDEAL COMMUTATOR DRESSER Co., Sycamore, Ill., has acquired the Marshall Electric Co., Elkhart, Ind., which manufactures automatic voltage, current and speed-control regulating equipment.

WESTINGHOUSE ELECTRIC & MFG. Co. will move its Pittsburgh (Pa.) office and some of its general offices about May 1 to the Union National Bank Building. The company will occupy the fifth to thirteenth floors.

AHLBERG BEARING Co., Chicago, has appointed P. H. Staerk as manager of its industrial division in charge of sales of mounted bearings. Starting with the company in 1920, he has been branch manager at St. Louis, Mo., and Detroit, Mich.

Elk Horn Co. Reorganized

The reorganization plan of the Elk Horn Coal Corporation, with offices in Cincinnati, Ohio, and operations in Letcher and Floyd counties, Kentucky, has been approved by federal Judge Robert Nevin, effective March 1. The new company, bearing the same name as the old, has elected the following officers: Clarence W. Watson (trustee during reorganization proceedings), president; R. H. Kelly, executive vice-president; J. F. Caulfield, vice-president and treasurer; J. H. Baker and T. H. Richardson, vice-presidents; C. H. Schupp, general sales manager, and T. S. Haymond, general manager of operations. The main offices in Cincinnati, Ohio, are to be moved on April 1 to larger quarters in the Carew Tower.

An outstanding improvement by the company, according to Mr. Haymond, is the erection of a new preparation plant in its Wayland division. This is now under way, and with its completion the company expects to have one of the most up-to-date mines in the country.

Wilmot Distributor Named

Distribution of the Wilmot Menzies hydro separator and the Wilmot Simplex jig has been placed in the hands of the Roberts & Schaefer Co., Chicago. This arrangement is now effective, according to an announcement by the manufacturer, the Wilmot Engineering Co., Hazleton, Pa.

Mine Fatality Rate Recedes

Coal-mine accidents caused the deaths of 81 bituminous and 18 anthracite miners in January last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 39,610,000 tons, the bituminous death rate in January was 2.04 per million tons, compared with 2.56 in the corresponding month of the preceding year. The anthracite fatality rate in January last was 4.47, based on an output of 4,025,000 tons, as against 6.00 in January, 1936. For the two industries combined, the death rate in January last was 2.27, compared with 2.97 in the first month of the year before.

Comparative fatality rates for January, 1936 and 1937, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES *

January, 1936 and 1937

	Bituminous				Anthracite				Bituminous-Anthracite	
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Killed per Million Tons	
Cause	1936	1937	1936	1937	1936	1937	1936	1937	1936	1937
Falls of roof and coal	58	41	1.457	1.035	18	13	3.375	3.229	1.684	1.237
Haulage	16	19	.402	.480	.....	3	.....	.745	.355	.504
Gas or dust explosions:										
Local explosions	2	1	.050	.025	4	.....	.750	.....	.133	.023
Major explosions	8	.....	.201	.....	.....	.....	.....	.....	.177	.....
Explosives	5	.....	.126	.....	3	1	.563	.249	.177	.023
Electricity	1	4	.025	.101	1	.....	.187	.....	.044	.092
Mining machines	4	1	.101	.025	.....	.....	.....	.....	.089	.023
Other machinery	....	1	.....	.025	1	.....	.187	.....	.022	.023
Miscellaneous:										
Minor accidents	2	.....	.050	.....	3	.....	.563	.....	.111	.....
Major accidents	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shaft:										
Minor accidents	2	3	.050	.076	.....	.....	.....	.....	.044	.069
Major accidents	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stripping or open cut	1	.....	.025	.....	.....	.....	.....	.....	.022	.....
Surface	3	11	.075	.278	2	1	.375	.249	.111	.275
Grand total	102	81	2.563	2.045	32	18	6.000	4.472	2.969	2.269

* All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

SAFETY HAT

Davis Emergency Equipment Co., Chicago, offers the new McDonald safety hat (manufactured by the B. F. McDonald Co., Los Angeles, Calif.). Features of the hat are described as follows: light weight, durable, waterproof non-corrosive crown of duralumin which absorbs the blow by denting slightly when hit. In addition, the molded

lugs which support the crown on the internal safety cradle give greater blow absorption and make changing headbands easy; polished-metal surface, which reflects heat and makes the hat approximately 15 deg. cooler; safety cradle for the head with 6-point suspension, permitting greater blow distribution; interchangeable floating headband which fits any head size or shape and provides considerably more ventilation; and a slightly flexible molded rubber brim, making it more difficult for the hat to be knocked off when working in close places.

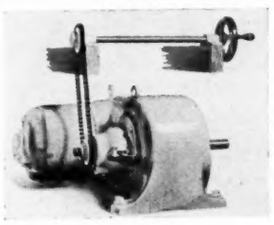
JACKS

Blackhawk Mfg. Co., Milwaukee, Wis., has developed a 20-ton-capacity portable hydraulic jack for heavy-duty work. The jack is a unit of the "Porto-Power" line, and consists of a pump and ram connected by 8 ft. of hose. Because of the remote-control feature, says the company, the ram operates at full capacity in any direction, making it ideally suitable for vertical lifting or downward pushing in a press frame. Collapsed, the height of the ram is 10¾ in. The plunger travels 4½ in., while a screw extension gives an over-all height of 18 in. Over-all diameter of the unit is 4 in. The base of the ram is threaded to permit addition of heavy extensions or mounting in a press frame, converting the device into a 20-ton hydraulic press. The pump may be mounted on a wheeled stand or carried to the work.

Blackhawk also offers the K-18 75-ton jack for locomotive work, extra-heavy erecting and lifting very heavy loads. It weighs, according to the company, less than half the ordinary jacks with the same rated capacities and is equipped with high- and low-pressure pumps for speed and lifting. One man, it is stated, can raise the capacity load with little effort and the unit is readily portable. The jack is 18 in. high when fully retracted, has a 10-in. hydraulic lift and a total height of 27 in. It is stated to be excellent for press work.

REMOTE CONTROL

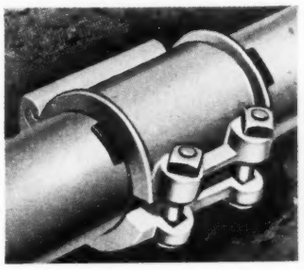
A new line of standardized parts for securing variable speeds by remote mechanical control has been developed by U. S. Electrical Motors, Inc., Los Angeles, Calif., for use with the U. S. Varidrive motor. The bearing supports, shafting, sprockets and chains



have been standardized so that the user can obtain variation of the speed of the driven machine conveniently and economically. The speed control, the company points out, is positive, as there is no slippage in the control mechanism, and infinite speed variation within the speed range of the Varidrive may be obtained.

PIPE CLAMP

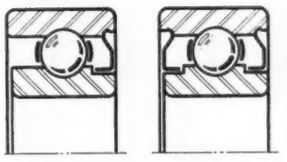
M. B. Skinner Co., South Bend, Ind., offers redesigned clamps for stopping leaks in pipes carrying air, gases, steam and liquids, both high and low pressure. Designed



for application while the pipe is in service, except in the case of very high pressures, the new clamps are said to be made of metal of a higher tensile strength and uniform density and hardness. Each clamp is tested to a pressure of 3,000 lb. per square inch.

BALL BEARINGS

The new "9000" series of self-sealed feltless "Precision" ball bearings is offered by the Norma-Hoffmann Bearings Corporation, Stamford, Conn., in two types: "9000-D," with single side shield, and "9000-DD," with two side shields. These bearings employ inwardly extending closely fitted flanged shields of the advanced type, which, it is declared, do not rotate or come in contact with rotating seal parts; are



"9000-D" "9000-DD"

equally effective in retaining grease in a horizontal or vertical position; and, not being subject to any wear, permanently maintain their efficiency. The shields are said to occupy less space in the bearing than the standard felt seal, and the "9000" series has greater grease capacity and a more lasting lubricant supply for long, continuous service. In the "9000-DD" type, the bearings are totally sealed against the entrance of dirt or foreign matter during assembly, operation or disassembly. The bearings are available in a full range of sizes and are interchangeable with single-felt-seal bearings of the wide-outer-ring type from 6 mm. to 26 mm. in bore.

ELECTRODE

Lincoln Electric Co., Cleveland, Ohio, offers the new "Chromeweld 4-6" electrode for welding low-chromium steels. Development of this electrode, the company states, makes available the simplicity and economy of arc-welded fabrication in a number of applications, including furnace tubing, heat exchangers, return bends, super-heater headers, etc.

BOX-CAR LOADER

Link-Belt Co., Philadelphia, Pa., offers a new type inexpensive box-car loader which it states is for handling bulk materials without raising a lot of dust and causing degradation in loading. The anti-

friction belt conveyor constituting the loading element is supported on a horizontal boom arranged so that it can be racked back and forth or rotated by hand 360 deg. on the caster-mounted truck. The conveyor is operated at a comparatively slow speed and has a discharge height of 5 ft. Being mounted on four large

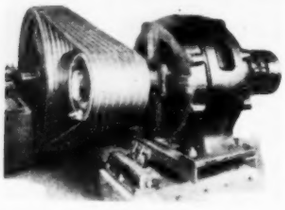
swiveling casters, it is possible for three men to move the machine into and out of cars, the company declares. One man can operate the machine after it is in place.

LOCATOR

The "M-Scope," a new instrument said to quickly locate buried pipes, cables and other metal objects and also to permit measurement of the depth at which they are buried without establishment of an electrical contact, is offered by the Fisher Research Laboratories Sales Co., San Francisco, Calif. The instrument is stated to consist of two specially designed radio units (transmitter and receiver) and for most services requires two men for operation.

V-BELT DRIVES

Rockwood Mfg. Co., Indianapolis, Ind., offering a complete line of V-belts, and accessories, including cast-iron and steel sheaves and rubber V-belts, announces new V-belt drives with Rockwood pivoted motor bases. These



bases, it is stated, improve V-belt performance by maintaining constant tension in the belts and thus preventing slippage as a result of stretching. Tension is removed from the belts when the motor is not running, giving them a chance to rest. Bases can be purchased separately for use with existing V-belt drives.

CONTROLS

A new and improved operating mechanism for the Type FH line of oil circuit breakers is announced by the General Electric Co., Schenectady, N. Y. Bearing the designation MK-110, the new mechanism supersedes the Type MK-10. By increasing the opening springs and modifying the trip mechanism to reduce friction, faster operating time is obtained. This, according to the company, permits rating all breakers (600

to 4,000 amp., inclusive) at eight cycles.

Another General Electric development is a new line of 15,000-volt oil circuit breakers utilizing the oil-blast principle and incorporating, it is stated, a simpler operating mechanism, simpler internal mechanism and fewer bearing points. The new breakers are identified as Types FLO-1A, FLO-1B and FLO-1C, with interrupting ratings of 50,000, 100,000 and 175,000 kva., respectively. The new breaker has a horizontal break with the three poles in a single rectangular steel tank. FLO-1A breakers have heavy butt-type arcing contacts; finger-type arcing contacts with large tips are used in the FLO-1B and FLO-1C breakers. The operating mechanism on all breakers of this type is built as an integral part of the breaker, whether manually or solenoid operated.

General Electric also has added a new low-current unit to the line of FP-19 automatic oil circuit reclosers. The new recloser has a current rating of 4 amp. and completes the line, which will now operate on currents up to 50 amp. at voltages from 2,200 to 7,500. The FP-19 recloser is normally closed in service. The unit which opens the circuit when a line fault occurs recloses after a three-second interval, and if the fault has not been cleared the circuit is reopened. Adjustment can be made for one, two or three reclosures, with three seconds between operations and with the device locking open after the last if the fault is still on the line. Then it must be reset manually.

A new electric heat gun combining an efficient electric heater with a hand vacuum cleaner and applicable to general maintenance work is offered by General Electric's Appliance and Merchandise Department, Bridgeport, Conn. Net price to the trade is $19.50, including all attachments for both heating and vacuum cleaning. A 1,000-watt heating element is used in the heater unit, which is readily attachable to the cleaner after removal of the dust bag. Power for air circulation is provided by a standard universal 110-volt a.c./d.c. motor.

CLAMP

To provide a suitable straight-line clamp for station dead-ending or for line use where a holding device of this type is preferred, Ohio Brass Co., Mansfield, Ohio, has developed the "Strateline" clamp. Ease of installation in either line or station is stressed by the company, which also states that the clamp is light in weight but develops slip strengths of 50 per cent of the ultimate strength of hard-drawn copper

conductors. The Strateline clamp is available in three sizes for cable diameters of 0.28 to 0.43 in., 0.42 to 0.55 in. and 0.54 to 0.68 in., and can be furnished with a socket eye, a clevis or no fitting.

DRILLING AIDS

Sullivan Machinery Co., Michigan City, Ind., has developed a new single-stage steam-driven horizontal compressor (Class WA-7) for steam pressures of 80 to 250 lb. per square inch, air pressures up to 150 lb. and capacities of 279 to 1,987 c.f.m. A variety of controls is available to provide greatest economy under each operating condition, including throttling flyball, governor for steady steam and air pressure, flywheel governor for variable steam with steady air pressure, etc.

Sullivan also offers the new No. 12 core drill, which it characterizes as the smallest of its family, with a 50 per cent increase in drilling speed. With either gasoline or electric drive, the machine is 4 ft. 7 in. high and weighs slightly over 1,000 lb. It comprises four parts—hoist, engine, swivelhead and frame—which can be dismantled quickly for easy transportation. Other features noted by the company include variable speed for efficient operation in either hard or soft material and hydraulic or screw feed swivelhead which can be set for drilling at any angle.

Improvements in the "Tannergas" and "Tanner Tank" airline anti-freeze systems said absolutely to eliminate freezing of air lines and keep drills, hoists, brakes, tools, etc., operating in temperatures down to 70 deg. below zero also are announced by Sullivan. Cost of treating 100 cu.ft. of free air per minute is stated to be approximately 7c. per 8-hour day; non-explosive and odorless.

COUPLING

Lovejoy Tool Works, Chicago, offers the new Type WF flexible coupling made with one of the bodies in the form of a flange which bolts onto the flywheel or a clutch or brake drum of a diesel, gas or steam engine. This flange-body design, according to the company, reduces coupling length one-third. The new coupling is offered in sizes from 3- to 14-in. bores suitable for 2,500 hp. at 100 r.p.m.

REGULATORS

A series of three new regulators stated to provide accurate oxygen and acetylene regulation throughout the entire range of welding and cutting operations has been developed by the Linde Air Products Co., New York City. All three are of the two-stage type, are essentially identical in design and are said to offer the utmost in precise, efficient pressure control. The Oxweld Type R-64 oxygen regulator is designed for all welding and cutting operations requiring oxygen pressures up to 75

lb. per square inch. The Type R-65 oxygen regulator is designed for heavy-duty cutting operations requiring pressures as high as 200 lb. per square inch. It can also be used for welding should the need arise. The Oxweld Type R-66 acetylene regulator is a companion unit for either of the oxygen regulators in all welding and cutting operations.